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Western Mining in the Twentieth Century Oral History Series

John Robert Clarkson

BUILDING THE CLARKSON COMPANY, MAKING REAGENT FEEDERS AND
VALVES FOR THE MINERAL INDUSTRY, 1935 TO 1998

With Introductions by
Curtis W. Clarkson
and
Edwin C. DeMoss

Interviews conducted by
Eleanor Swent
in 1997 and 1998

Since 1954 the Regional Oral History Office has been interviewing leading participants in or well-placed witnesses to major events in the development of Northern California, the West, and the Nation. Oral history is a method of collecting historical information through tape-recorded interviews between a narrator with firsthand knowledge of historically significant events and a well-informed interviewer, with the goal of preserving substantive additions to the historical record. The tape recording is transcribed, lightly edited for continuity and clarity, and reviewed by the interviewee. The corrected manuscript is indexed, bound with photographs and illustrative materials, and placed in The Bancroft Library at the University of California, Berkeley, and in other research collections for scholarly use. Because it is primary material, oral history is not intended to present the final, verified, or complete narrative of events. It is a spoken account, offered by the interviewee in response to questioning, and as such it is reflective, partisan, deeply involved, and irreplaceable.

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Mining equipment manufacturer

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Pioneer Idaho family background, WWI and influenza, Great Depression; Meadow Creek Mine, ID, stibnite metallurgy, developing a dependable reagent feeder for flotation process; marketing through American Cyanamid, 1936; construction and management of mines and mills in California and Arizona, 1934-1942; meeting urgent WWII demand for tungsten, Stibnite, ID, 1942-1952; Clarkson Company, Palo Alto, CA, 1952-1980, manufacturing feeders, centricones, constriction and gate valves; company move to Sparks, NV; mechanization, computerization, expansion of family-owned business. Appendix includes wife Edna Clarkson's written recollections of mining life during the Depression.

Introductions by Curtis W. Clarkson, President, The Clarkson Company, and Edwin C. DeMoss, President and CEO (retired), Pathfinder Mines Corporation.

Interviewed in 1997 and 1998 by Eleanor Swent for the Western Mining in the Twentieth Century series. The Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

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PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals. In its tenth year the series numbers thirty-five volumes completed and others in process.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies. Langan Swent delighted in referring to himself as "technical advisor" to the series. He abetted the project from the beginning, directly with his wise counsel and store of information, and indirectly by his patience as the oral histories took more and more of his wife's time and attention. He completed the review of his own oral history transcript when he was in the hospital just before his death in 1992. As some of the original advisors have died, others have been added to help in selecting interviewees, suggesting research topics, and securing funds.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr., was the speaker. This section and the Southern California section of AIME provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME (WAAIME), the California Mining Association, and the Mining and Metallurgical Society of America (MMSA) were early supporters. Later the National Mining Association became a sponsor. The

project was significantly advanced by a generous bequest received in November 1997 upon the death of J. Ward Downey, UC Berkeley alumnus and early member of the mining series advisory committee. His own oral history was completed in 1992. Other individual and corporate donors are listed in the volumes. Sponsors to date include nineteen corporations, four foundations, and 113 individuals. The project is ongoing, and funds continue to be sought.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of United States Potash Company, was ninety-six years old when interviewed. Although brief, this interview adds another dimension to a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987. In 1990, he was inducted into the National Mining Hall of Fame, Leadville, Colorado.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council. His uncle, Frederick Worthen Bradley, who figures in the oral history, was in the first group inducted into the National Mining Hall of Fame in 1988.

Frank McQuiston, metallurgist for the Raw Materials Division of the Atomic Energy Commission and vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes. After over thirty individual biographical oral histories were completed, a community oral history was undertaken, documenting the development of the McLaughlin gold mine in the Napa, Yolo, and Lake Counties of California (the historic Knoxville mercury mining district), and the resulting changes in the surrounding communities. This comprises forty-three interviews.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs, and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings. A list of completed and in process interviews for the mining series appears at the end of this volume.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

Willa K. Baum, Division Head
Regional Oral History Office

Eleanor Swent, Project Director
Western Mining in the Twentieth
Century Series

January 1998
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University of California, Berkeley

Western Mining in the Twentieth Century Oral History Series

Interviews Completed, June 1999

Horace Albright, *Mining Lawyer and Executive, U.S. Potash Company, U.S. Borax, 1933-1962*, 1989

Samuel S. Arentz, Jr., *Mining Engineer, Consultant, and Entrepreneur in Nevada and Utah, 1934-1992*, 1993

James Boyd, *Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987*, 1988

Philip Read Bradley, Jr., *A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia*, 1988

Catherine C. Campbell, Ian and Catherine Campbell, *Geologists: Teaching, Government Service, Editing*, 1989

William Clark, *Reporting on California's Gold Mines for the State Division of Mines and Geology, 1951-1979*, 1993

Clarkson, John Robert, *Building the Clarkson Company, Making Reagent Feeders and Valves for the Mineral Industry, 1935 to 1998*, 1999

Norman Cleaveland, *Dredge Mining for Gold, Malaysian Tin, Diamonds, 1921-1966; Exposing the 1883 Murder of William Raymond Morley*, 1995

James T. Curry, Sr., *Metallurgist for Empire Star Mine and Newmont Exploration, 1932-1955; Plant Manager for Calaveras Cement Company, 1956-1975*, 1990

Donald Dickey, *The Oriental Mine, 1938-1991*, 1996

J. Ward Downey, *Mining and Construction Engineer, Industrial Management Consultant, 1936 to the 1990s*, 1992

Warren Fenzi, *Junior Engineer to President, Director of Phelps Dodge, 1937 to 1984*, 1996

Hedley S. "Pete" Fowler, *Mining Engineer in the Americas, India, and Africa, 1933-1983*, 1992

- James Mack Gerstley, *Executive, U.S. Borax & Chemical Corporation; Trustee, Pomona College; Civic Leader, San Francisco Asian Art Museum, 1991*
- Robert M. Haldeman, *Managing Copper Mines in Chile: Braden, CODELCO, Minerec, Pudahuel; Developing Controlled Bacterial Leaching of Copper from Sulfide Ores; 1941-1993, 1995*
- John F. Havard, *Mining Engineer and Executive, 1935-1981, 1992*
- Wayne Hazen, *Plutonium Technology Applied to Mineral Processing; Solvent Extraction; Building Hazen Research; 1940-1993, 1995*
- George Heikes, *Mining Geologist on Four Continents, 1924-1974, 1992*
- Helen R. Henshaw, *Recollections of Life with Paul Henshaw: Latin America, Homestake Mining Company, 1988*
- Homestake Mine Workers, Lead, South Dakota, 1929-1993, interviews with Clarence Kravig, Wayne Harford, and Kenneth Kinghorn, 1995*
- Lewis L. Huelson, *Manager of Gold and Chrome Mines, Spokesman for Gold Mining, 1935-1974, 1988*
- William Humphrey, *Mining Operations and Engineering Executive for Anaconda, Newmont, Homestake, 1950 to 1995, 1996*
- James Jensen, *Chemical and Metallurgical Process Engineer: Making Deuterium, Extracting Salines and Base and Heavy Metals, 1938-1990s, 1993*
- Arthur I. Johnson, *Mining and Metallurgical Engineer in the Black Hills: Pegmatites and Rare Minerals, 1922 to the 1990s, 1990*
- G. Frank Joklik, *Exploration Geologist, Developer of Mt. Newman, President and CEO of Kennecott, 1949-1996; Chairman, Salt Lake 2002 Olympic Winter Games Committee, 1997*
- Evan Just, *Geologist: Engineering and Mining Journal, Marshall Plan, Cyprus Mines Corporation, and Stanford University, 1922-1980, 1989*
- Robert Kendall, *Mining Borax, Shaft-Freezing in Potash Mines, U.S. Borax, Inc., 1954-1988, 1994*
- The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume I, 1998*
- Anderson, James, "Homestake Vice President-Exploration"
- Baker, Will, "Citizen Activist, Yolo County"
- Birdsey, Norman, "Metallurgical Technician, McLaughlin Process Plant"
- Bledsoe, Brice, "Director, Solano Irrigation District"

The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume II, 1998

Cerar, Anthony, "Mercury Miner, 1935-1995"

Ceteras, John, "Organic Farmer, Yolo County"

Conger, Harry, "President, Chairman, and CEO, Homestake Mining Company, 1977 to 1994"

Corley, John Jay, "Chairman, Napa County Planning Commission, 1981-1985"

Cornelison, William, "Superintendent of Schools, Lake County" (Includes an interview with John A. Drummond, Lake County Schools Attorney)

The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume III, 1998

Crouch, David, "Homestake Corporate Manager-Environmental Affairs"

Enderlin, Elmer, "Miner in Fifty-Eight Mines"

Fuller, Claire, "Fuller's Superette Market, Lower Lake"

Goldstein, Dennis, "Homestake Corporate Lawyer"

Guinivere, Rex, "Homestake Vice President-Engineering"

The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1995, Volume IV, 1998

Gustafson, Donald, "Homestake Exploration Geologist"

Hanchett, Bonnie, "Owner and Editor, Clearlake Observer"

Hickey, James, "Director, Napa County Planning Department"

Jago, Irene, "Lower Lake High School Teacher"

Jonas, James, "Bulk Fuel Plant Owner, Lower Lake"

Koontz, Dolora, "Environmental Engineer, McLaughlin Mine"

The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, 1978-1997, Volume V, 1999

Kritikos, William, "Operator, Oat Hill Mine"

Landman, John, "Rancher, Morgan Valley"

Lyons, Roberta, "Journalist and Environmentalist"

Madsen, Roger, "Homestake Mechanical Engineer"

Magoon, Beverly, "Merchant and Craft Instructor, Lower Lake"

McGinnis, Edward, "Worker at the Reed Mine"

Marian Lane, *Mine Doctor's Wife in Mexico During the 1920s*, 1996

Plato Malozemoff, *A Life in Mining: Siberia to Chairman of Newmont Mining Corporation, 1909-1985*, 1990

James and Malcolm McPherson, *Brothers in Mining*, 1992

Frank Woods McQuiston, Jr., *Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982*, 1989

Gordon B. Oakeshott, *The California Division of Mines and Geology, 1948-1974*, 1988

James H. Orr, *An Entrepreneur in Mining in North and South America, 1930s to 1990s*, 1995

Vincent D. Perry, *A Half Century as Mining and Exploration Geologist with the Anaconda Company*, 1991

Patrick Purtell, *Maintenance and Management at the McLaughlin Mine*, 1985 to 1997, 1999

Carl Randolph, *Research Manager to President, U.S. Borax & Chemical Corporation*, 1957-1986, 1992

John Reed, *Pioneer in Applied Rock Mechanics, Braden Mine, Chile, 1944-1950; St. Joseph Lead Company, 1955-1960; Colorado School of Mines, 1960-1972*, 1993

Joseph Rosenblatt, *EIMCO, Pioneer in Underground Mining Machinery and Process Equipment*, 1926-1963, 1992

Eugene David Smith, *Working on the Twenty-Mule Team: Laborer to Vice President, U.S. Borax & Chemical Corporation*, 1941-1989, 1993

Simon Strauss, *Market Analyst for Non-ferrous Metals and Non-metallic Minerals, Journalist, Mining Corporation Executive*, 1927-1994, 1995

Langan W. Swent, *Working for Safety and Health in Underground Mines: San Luis and Homestake Mining Companies*, 1946-1988, 1995

James V. Thompson, *Mining and Metallurgical Engineer: the Philippine Islands; Dorr, Humphreys, Kaiser Engineers Companies*; 1940-1990s, 1992

William Wilder, *Owner of One Shot Mining Company: Manhattan Mercury Mine*, 1965-1981, 1996

Interviews In Process

Frank Aplan, metallurgist

John Livermore, geologist

David Lowell, geologist

Robert Shoemaker, metallurgist

Alexander Wilson, BHP-Utah Minerals

Knoxville/McLaughlin Interviews in Process:

Ingle, Hugh, Jr., "Mining Engineer, 1948-1998"

Krauss, Raymond, "Environmental Manager, McLaughlin Mine"

McKenzie, Robert, "Photographer and Local Historian, Napa County"

Moskowite, Harold, "County Supervisor, Napa County"

Onstad, Marion, "Morgan Valley Rancher, Homestake Secretary"

Parker, Ronald, "General Manager, McLaughlin Mine, 1988-1994"

Stoehr, Richard, "Homestake Vice President and Director"

Strapko, Joseph, "Homestake Field Geologist"

Thompson, Jack, "General Manager, McLaughlin Mine, 1981-1988"

Thompson, Twyla, "County Supervisor, Yolo County"

Tindell, Avery, "Capay Valley Environmentalist"

Turney, John, "McLaughlin Metallurgist: Pioneering Autoclaving for Gold"

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INTRODUCTION by Curtis W. Clarkson

It is an honor for me to be asked to write an introduction to my father's oral history. I entered the scene at Greenville, California, in 1939 when he was still mill superintendent at the Indian Valley Mining Company's Standard Mine. My first recollection, however, is after 1942 when Dad returned to Stibnite, Idaho, to take charge of the Meadow Creek Mill expansion to treat complex antimony and tungsten Ores from Bradley Mining Company's Yellow Pine Mine two miles to the north. This was a major undertaking in support of the World War II effort.

We lived in Stibnite in the remote Salmon River Mountains of central Idaho for nine years, 1942-1951. A boy could not have asked to spend his formative years in a better place. The location alone did not make Stibnite a great place to live and work; after all, the winters were long and severe. The company, the challenge, the community and, of course, the war all gave the people there a sense of purpose and commitment.

Well, Dad was a major participant in the Stibnite story. When they were first married, Mom and Dad together lived in a more primitive Stibnite in the early 1930s than we found when we returned there in 1942. Modern homes were being constructed and transportation had greatly improved. Like everyone else we had all the comforts, even though that meant a wood burning kitchen stove the first few years, but that was all Mom had ever cooked on anyway and she was good at it. Like most men who worked at Stibnite, Dad knew how to deal with the elements of a remote high mountain location, but a comfortable home for his family freed him to devote his talents, expertise, and energy to Bradley's mission.

It was Otto Brown, a well-known American Cyanamide metallurgist, who recommended Dad for the job at Stibnite after he had spent some twelve years preparing himself at mines in Idaho, California, Nevada, and Arizona for an opportunity like this. Along the way, he had developed the Clarkson reagent feeder which became a world standard for feeding flotation reagents. Dad had mechanical skills, the talents of a good millwright, engineering expertise, and as an experienced supervisor and team player, he knew he had to pull the best talented people together to be successful. As well, Bradley's senior management and professional staff were all tops in their field and Dad's mechanical and construction background complimented the abilities of the others in the overall scheme of meeting the critical demand for antimony and tungsten.

Dad's interest in flying resulted in Bradley's making an airplane available to him, a North American Navion, which was a great plane for mountain flying. This advantage was a tremendous support for sharing

management and consulting with other Bradley and associated mining operations. Telephone communications were often difficult and driving between mining districts took days. There were many other advantages to having airplanes and skilled pilots at Stibnite. Dad was called on many times for medical evacuation, patrolling the power lines over mountain terrain in search of a downed line, and assisting in search and rescue operations for lost aircraft and others lost in those rugged mountains. But the best use of the plane, in my opinion, was for taking Stibnite kids on fishing trips to the Middle Fork of the Salmon River.

In 1950, a new opportunity presented itself to Dad. American Cyanamide, who had been manufacturing the Clarkson reagent feeder under license along with the Fagergren Flotation Machine, was getting out of equipment manufacturing. Dad's decision, along with Kellogg Krebs, a Cyanamide metallurgist, was to form a partnership, The Clarkson Company, to manufacture and sell Clarkson feeders and develop additional process equipment for the mining industry.

The early 1950s led to the development of the Krebs hydrocyclone and the first Clarkson slurry valves. 1957 saw the first installation of Krebs hydrocyclones in closed circuit primary grinding as ASARCO's Silver Bell Mine in Arizona. Dad provided the mechanical design expertise and Kellogg Krebs and his brother, Richard, provided the marketing and sales expertise. Clarkson slurry valves and designs found application with the cyclones that launched their introduction to the mining industry.

In 1959, Dad and the Krebs brothers separated their interests. The success of hydrocyclone application and further developments by Krebs Engineers, Inc., has truly had a great impact on mineral processing technology. For Dad and The Clarkson Company, new product development was focused on slurry valves for both throttling and on-off control of abrasive and corrosive slurries. Once again, his design expertise brought forth valves that could be used in critical applications that only used make-do solutions in the past. The flow sheets in many new mills eliminated valves where possible because valve manufacturers gave little or no attention to the unique requirements of slurry flow. Dad changed this concern on the part of mill design engineers and operators by making valves that are reliable and functionally sound in difficult slurry applications.

In the end, I have been the primary beneficiary of this wonderful legacy and I have always been very proud of my Dad. At Stibnite, I spent many hours on the job with him trudging through deep snow on construction sites, crawling into the rod mill when he had to inspect liner wear, and most of all, enjoying the men on his crews. Whenever there was a vacant seat, I also went along on flying trips. At The Clarkson Company, I always had a summer job assembling reagent feeders and cyclones and then packing them for shipment, and at day's end,

sweeping floors. As you would expect, I got my degree in mining engineering and worked summers for ASARCO as a relief mill operator at Silver Bell. Upon graduation, they hired me as a mineral processing engineer at the Mission Mine. When I left ASARCO to join The Clarkson Company, I was a shift foreman at Silver Bell. I came to Clarkson as engineering manager and when Dad decided to step down, I became president.

After nearly fifty years in business, Dad's legacy lives on at The Clarkson Company. We continue to develop new valve designs to meet unique requirements as mineral processing technology changes. Dad believes the only constant in business is change.

Curtis W. Clarkson, President
The Clarkson Company

January 14, 1999
Sparks, Nevada

INTRODUCTION by Ed DeMoss

It is my pleasure to submit this introduction of John Robert Clarkson. I first became acquainted with Bob Clarkson shortly after I commenced working at Bradley Mining Company's Yellow Pine Mine at Stibnite, Idaho, in 1942. I can assure you that Bob is a very unique and very talented person. As you will see by reading his oral history of his mining experiences, he has done a great many things, and some are extraordinary, such as a tailings system that he designed and installed for the enlarged mill at Yellow Pine Mine. This was at a time before most mine operators were concerned about environmental matters and there were instances where we were all lax in those days, but Bob built a tailings disposal system that impounded all sands, slimes, and discolored water. The decant intake was at a great enough distance at the upper end of the pond so that the pond overflow and bypass water that was diverted in a pipe system under the tailings dam was clean and clear. However, his most obvious accomplishment is his development of one of his inventions, the Clarkson reagent feeder. This led to the organization of The Clarkson Company and the invention of his renowned line of slurry valves that are now produced by The Clarkson Company and are in use in many industries all over the world.

I would like to share with you some of the interesting experiences that I have had with Bob, especially a few involving one of Bob's real loves, and that is flying in Idaho's back country. After I returned from Stibnite from two years in the navy, both Bob and I each owned and flew our small light airplanes. Additionally, Bob was Bradley Mining Company's pilot and had access to the company's four-passenger Navion. I recall one occasion that Bob and I flew about three loads each, hauling the Stibnite Boy Scout Troop from Stibnite to the Indian Creek landing strip on the Middle Fork of the Salmon River, then bringing them back after a couple days fishing on what was then a relatively untouched fishing stream. They had a memorable experience and a few told me many years later it was one of the highlights of their boyhood.

Another flying experience of Bob's took place during the Christmas season one year when the snow in the Idaho back country was deep. One of his workmen, a machinist who also owned an airplane, wrecked it on an isolated airfield at Bruce Meadows when landing with skis. He had intended on spending Christmas with a friend who was wintering in his cabin about thirty miles from the nearest road that was kept open during the winter time. When the machinist did not return on schedule, Bob became concerned and flew over Bruce Meadows and saw the wrecked plane. He then flew over the cabin and saw that the wife of the cabin owner was alone. Both of the fellows were walking out on snow shoes, so Bob followed their trail, found them, and dropped a note describing where he

could land on a nearby meadow and pick them up. He then flew one back to Bruce Meadows and the other back to Stibnite.

Bob did so many things while flying at Stibnite in the forties and early fifties, such as dropping supplies in the winter time to prospectors in isolated cabins, supervising the packaging, flying, and dropping seventy-eight parachute loads from a Ford trimotor airplane a complete diamond drill and related equipment to an exploration site many miles in the back country. He also escaped an accident on one occasion when he was taking off the Stibnite airfield. He was flying the Bradley Mining Company Navion when about halfway down the runway, which was at 6,500 feet elevation, a tip of one blade of its metal propeller broke off. Bob was able to get the aircraft stopped before he reached the end of the runway, but the vibration was so severe that it almost shook the engine off its mounts.

Our social life in Stibnite was such that most of the people were very close to one another. In less than a year after arriving at Stibnite, I was married, and my new wife and I lived next door to the Clarksons. Consequently, we became well acquainted with Bob and his family and have remained close through the years. We have a son who worked at The Clarkson Company plant in Palo Alto a couple of summers when he was in high school. Some years later he was married in London and it was impossible for us to attend the wedding. Bob, his wife, and granddaughter were in Europe at the time and were able to adjust their schedule so they could be with our son at his wedding.

Stibnite was an isolated mining camp in the forties and it was going through a boom period because of the discovery of a tremendous tungsten ore body just at the time it was needed desperately because the United States was preparing for the war effort of World War II. Quite an exceptional group of mining people were brought together at this "out of the way" place and most of them have remained the best of friends. The Clarkson Company in January 1995 had a big party to celebrate Bob's eighty-fifth birthday. All of his employees, family, and many of his old Stibnite friends from all over the West came to Reno to honor him. The same was true earlier when The Clarkson Company moved from Palo Alto to its new office and plant in Sparks, Nevada, and held an open house to commemorate the new facilities, so many friends came from great distances, mainly as a tribute to Bob.

At this writing Bob is still active as chairman of The Clarkson Company board and still amazes his friends because of his ability to accomplish a task, whether in his company business or in his home shop.

Ed DeMoss, President and CEO (retired)
Pathfinder Mines Corporation

New Meadows, Idaho
February 1999

INTERVIEW HISTORY--J. Robert Clarkson

Robert Clarkson's name was on the earliest list of potential interviewees for the oral history series on Western Mining in the Twentieth Century. He was proposed by Philip Bradley, whose oral history was the first in the series to be presented. Clarkson's career in mining began in Idaho, where the Bradleys were major figures, known for their dedication to employee welfare. This management philosophy has also characterized the Clarkson Company, which began with after-hours tinkering in a woodshed and is now a worldwide supplier of dependable reagent feeders, knife-gate valves, and slurry control valves for the mining, power, pulp and paper, and other industries.

The letter of invitation to participate in the oral history series was sent to Robert Clarkson in October 1997 and he promptly accepted. Six interviews were conducted on 17 November 1997, 8 December 1997, 9 February 1998, 23 February 1998, 23 March 1998, and 13 April 1998. The first five interviews were held at the Clarkson Company office in Sparks, Nevada; the final interview was in the Clarkson home in Reno.

Before beginning the interviews, I queried several people in the mining industry about what made the Clarkson reagent feeder so special in the 1930s: after all, it seemed a rather simple device, variations of which were already in wide use. The answer was, "With a Clarkson product, you knew that it would work, and if something did go wrong, someone came right away and stayed there to fix it." Most employers pay lip service to customer satisfaction, product dependability, and good employee relations; Bob Clarkson really put those ideals into action.

The Clarkson Company is in a nicely landscaped two-story building; an ore car containing specimens from Anaconda mines stands by the entrance. Inside by the front door is a large polished redwood slab with the familiar Clarkson global logo; in his oral history, Bob tells how he and his beloved wife Edna picked out the wood, thinking first to make it into a coffee table. It is an example of how closely interwoven his business career is with his home and family.

As in many company headquarters, on the walls there are plaques, trophies, photos of sports teams, U.S. Senators presenting awards, certificates of appreciation, postal covers exemplifying a worldwide business. What is not so customary is the case containing miscellany such as an antique hard hat and a miner's lamp which belonged to Bob's father, representing a previous generation in mining. There are a number of aerial photos of mines; Bob's career has included a lot of flying as well as photography. The conference room is also a classroom where after-school activities for children of employees are directed by a certified teacher. A 1973 McGraw Hill wall chart "History of Mining

and Minerals" begins at 41,000 B.C. with mining of hematite; it shows in 1935 the first Clarkson reagent feeder. On the wall are plaques of signal patents granted through several decades for a flow control valve, a screw actuated pinch valve, various gate valves, and a line blind valve.

Bob's son Curtis Clarkson, now president of the company, led a tour of the plant where they manufacture, assemble, and ship their valves. He explained that tooling is done in a cell, not on an assembly line. Although computerized robotics are in use, there is still considerable hand work, burring and fitting. The elastomers are molded much like cookies in a press. The standard Clarkson valve color is bright green, but it can be customized on demand. Curt speaks proudly of their classification as a Class A level facility in management resources planning. In 1986 they had \$6 million in sales and an inventory of \$1 million. Now they have \$23 million in sales, with the same inventory and 99 percent of deliveries made on time. The company has also earned ISO 9000 [International Standards Organization] accreditation as well as certification by the National Standards Association of Ireland and by the American Production & Inventory Control Society.

Two small dining rooms in the plant separate employees not by their rank but to keep non-smokers and smokers apart. During the tour, Bob remarks that one thing that bothers him is that he has difficulty remembering the first names of all the employees now that there over 100 and many of them are new.

To conduct the interviews I flew to Reno, arriving about 10 a.m. Bob met me and drove me to the office. After interviewing for an hour or two we broke for lunch, twice at restaurants near the office, more often for sandwiches brought in. His son Curt, son-in-law Omer King, marketing director Hank Frohlich, and executive assistant Valerie Jochimsen joined us at various times. Edna Clarkson sent cookies. The final interview was conducted in their beautiful home and their daughter Claudia King served us lunch. After another hour or two of interviewing, Bob returned me to the airport. More than once, a few minutes after I stepped into my house, the telephone rang and it was Bob, making sure I had arrived safely. This touched me deeply.

My notes for the interview of March 3, 1998, include this:

Today we were interrupted once by the secretary getting his car keys because it had begun to rain and someone noticed that his car window was slightly open. These people really care about each other.

He shows me the photos he took at the AIME convention last week in Orlando. Edna was not well enough to go so he

took a lot of pictures for her benefit. There are photos of their booth and display with visitors, the gardens outside the convention center and the hotel, various social events, and one of the Presbyterian minister and the church where they had worshipped on Sunday.

In his interview, Clarkson recalls his experiences beginning to work in Depression days, driving a truck and working as a laborer in mines and mills in Idaho. He designed, built, and managed at various mines and mills in California, Nevada, and Arizona. At the same time he was, as he said, "always a tinkerer," and applied his talents to developing the reagent feeder which was first marketed by American Cyanamid Company. He returned to Stibnite, Idaho, in 1942 as manager of construction for the tungsten mine which was critically important to the war effort. He tells how he and Kellogg Krebs set up a partnership in 1950 to manufacture and market the centriclone (also called a hydrocyclone) and the C-valve, and how they later separated into two successful companies, with the Clarkson Company continuing production of reagent feeders and valves. His account has value as a business history describing transition from a lone operation to a partnership to a corporation and from an assembly operation to a vertically integrated one. It becomes a social history when it recounts the pressures which led them to move from California to Nevada. He gives a good account of changes in mining and milling methods throughout his long career, and incidentally some history of two important mining companies, Bradley Mining Company and Utah Construction and Mining Company (now part of BHP). [In May 1999, after the oral history was completed, Clarkson Company became part of the Tyco Flow Control Division of Tyco International, Limited. Clarkson management will continue to oversee operations of the company, and Robert Clarkson will maintain his same office.]

Edna Clarkson's memoir fragment vividly recalls poignant but joyfully remembered Depression times. Regrettably, we were unable to complete the volume in time for her to see it before her death in May 1999. Introductions were provided by Curtis Clarkson and by longtime friend and colleague Ed DeMoss. Robert Clarkson had an abundant file of photographs, all meticulously labeled, from which we selected those used in the volume. He donated for our archives a number of historical documents including the Bradley Mining Company employees' manual for 1948 and a history of Stibnite compiled in 1947. Funding for the Clarkson oral history was provided by Alexander and Beverlee Wilson and by the Clarkson Company.

The tapes of the Robert Clarkson interviews were transcribed by the Regional Oral History Office, lightly edited, and sent to him for review. He said of the editing that it was similar to inventing: "once you have a prototype, then you can work to make it better." He made some corrections and added some comments which are indicated by curly

care. The tapes are deposited in The Bancroft Library and are available for study.

The Regional Oral History Office was established in 1954 to record the lives of persons who have contributed significantly to the history of California and the West. The office is a division of The Bancroft Library and is under the direction of Willa K. Baum.

Eleanor Swent, Senior Editor
Regional Oral History Office

The Bancroft Library
Berkeley, California
May 1999

Regional Oral History Office
Room 486 The Bancroft Library

University of California
Berkeley, California 94720

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name John Robert Clarkson

Date of birth Jan. 21, 1910 Birthplace Horseshoe Bend, ID.

Father's full name Frank Wylie Clarkson

Occupation Rancher - Carpenter Birthplace Greenton Valley, MO.

Mother's full name Mollie Augusta Zimmer Clarkson

Occupation Homemaker Birthplace Dwight, IL.

Your spouse Edna Mae Evans Clarkson

Occupation Homemaker Birthplace Quartzburg, ID.

Your children Claudia Lucille Clarkson King

Curtis Wylie Clarkson

Where did you grow up? Horseshoe Bend, Boise County, ID.

Present community Reno-Sparks, Washoe County, NV.

Education 12th grade, 1929, Univ. of Hard Knocks (U.H.K.)

Honorary, founded by the W.Va. Hillbilly & A.B. College

Occupation(s) Ranch boy, truck driver, mucker, Ore mill operator, maintenance, design and construction.

Areas of expertise Mill & Crusher plant design & construction.

Milling equipment design & development some of which provided a basis, 1950, to start a company.

Other interests or activities Aviation - To become a pilot (1928)

Mining Camp & Community activities - Outdoor sports hunting & fishing, world travel, mining & aviation history.

Organizations in which you are active SME of AIME, CIM-Canada

Masonic Orders, Lions International, Newcomen Soc. and church.

I FAMILY BACKGROUND AND EARLY YEARS TO 1931

[Interview 1: November 17, 1997] ##¹

Grandfather Samuel Anselm Clarkson, Forty-Niner

Swent: We're beginning an interview and it's kind of an exciting moment.

Clarkson: And a nervous one.

Swent: I know it is. You can't help that; it just is. But we'll relax after we get going. I thought we might start with your talking about your California ancestry. You have a distinguished background in California.

Clarkson: Well, my grandfather Clarkson, Samuel [Anselm] Clarkson, stemmed from a Virginia family, an early-day family, and then they moved to Kentucky. The '49er gold rush came along, and with a brother, why, he participated in that. I don't have much detail on it because a lot of his material was lost.

Swent: Do you know how he got out there?

Clarkson: Yes, he came with a group overland.

Swent: Overland?

Clarkson: Overland. But he apparently made one trip later on by ship around--returned home and then out again by way of the isthmus because my son-in-law, Omer King, was working for the state [of California] and, in searching the records in San Francisco, he found my grandfather's name on one of the ship passenger lists.

¹## This symbol indicates that a tape or tape segment has begun or ended. A guide to the tapes follows the transcript.

And that's the only information found, but it was his name, Samuel Anselm Clarkson.

Swent: Anselm?

Clarkson: A-n-s-e-l-m. That was a family name, surname, somewhere back. But then, in the course of that, Omer was working for the state in Sacramento. He searched the records, and he found the land record that our grandfather left mining to take up farm land in the Elk Grove area. He owned 160 acres there, which he sold to Juan De Deas Baseta. I have the record about it here. He sold that land in 1857. That's when gold was discovered in that period in Idaho. It was Washington Territory then. He went to the north of the Salmon River, and he was there for a while, in a mining camp that was known as Florence. Florence, Idaho.

Owner of the First Stamp Mill in the Boise Basin, Idaho

Clarkson: And then, from there to the gold discovery in the Boise Basin. I have a record of his mining claim locations there. He located mining claims there in 1863, and he had some partners in that. His was the first gold lode mine that was discovered and operated in the district. He imported by overland freight a stamp mill and set up the first stamp mill in the area, along with--and in that period of time, my grandmother-to-be was brought West by an uncle. He was a mining man and also a rancher in the lower valley, when he brought two teenage nieces out West. Well, he had been a partner, too, I guess, with my grandfather; Andrew McQuade.

Grandmother Mary Josephine Wylie Clarkson

Clarkson: And so one of his nieces met this miner, Samuel Clarkson, and they were married soon afterward. They lived in the Basin area where the mine was, and then later on, when the family was getting underway, my grandfather Clarkson homesteaded land and went to farming to raise his family. My dad, Frank, was the oldest son. He also got experience in mine work. He was the second generation to take over the homestead of the Clarkson ranch. And then my older brother was the next generation to take it. That was where all of the children, that is, my

brother and two sisters, they were all, including me, born on the ranch.

Swent: At Horseshoe Bend?

Clarkson: At Horseshoe Bend. The Horseshoe Bend Valley was a breadbasket for the Boise Basin people because of the higher elevation there--it was not a good farm area. But just over on the Payette River was a great farming area, so many of the miners that came to the Boise Basin wound up having homesteads in the various tributaries there, to raise their families, when they married or if they were already married.

And that was the way with my maternal grandparents, too. Grandpa Zimmer came to the gold mining area and then became a farmer there. There was a lot more money in supplying food stuff to the miners and the loggers than being miners and woodsmen. But some of them did both--seasonal work.

Farmers and Miners at the Same Time

Swent: Do you think that many men did both farming and mining at the same time?

Clarkson: Oh, yes. Around Horseshoe Bend there were gold mining areas, placer mining along the river, on the Payette River. There was even a coal mine right down in the valley there. It didn't turn out to be a very successful coal mine. The coal that was discovered was lignite, very low-grade coal. But it contributed to the community and the life style. And there were hardrock mines along the river. But one quite notable area, the Pearl District, is up on the mountain, just southwest of Horseshoe Bend. The mountain range there was between the Payette River and the Boise River over on the other side, the Boise Valley area. But there was some gold mining all through the area. The Boise Basin started out as a placer mining area, and some hardrock mines were discovered in the course of placer mining. And then dredges came in. A lot of the area was dredged, like in California.

Swent: Do you remember seeing dredges?

Clarkson: Yes. There's one dredge still left. It's a modern bucketline floating Yuba-type dredge. It's now a state museum a ways

north of there, in what's called the Yankee Fork district, a tributary of the main Salmon River that flows north out of the area. But some of the dredging activity on that area during World War II was for monozite. In Custer and Valley Counties. Two of the dredges, I think, switched from gold to monozite. That was one of the famous dredging areas.

Swent: I think that the dredging began there before it did in California.

Clarkson: The same famous dredge man, Estabrook was the name, mined and dredged in the Boise Basin. And then Hammon, in California, in the Marysville area. One of my dad's brothers, Edgar, was a dredge master. He worked for Estabrook, which was one of the early ones in there. Then gold was discovered for dredging in Alaska. My uncle went to Alaska from Hammon, the Hammon area, to work on the dredges up there in one of the bays.

Swent: Was it up around Nome?

Clarkson: Nome, yes. The first. He went there and worked a while and then back to Idaho to raise his family. That was his last mining, mine work or dredging work, was at Nome, Alaska.

Swent: So you grew up in a family and a community where there was both mining and farming going on.

Clarkson: And lumbering. Because all of that was necessary for the early-day mining. Supply of lumber, timber for the mines and homes and for the farmers.

Swent: What kind of house did you grow up in?

Clarkson: Well, it was a typical farm house, two-story frame house. My dad built a second one, a larger house, in later years. It's still there.

Swent: Built of wood?

Clarkson: Oh, yes. My dad was a carpenter and millwright. After he retired from ranch work, my brother took over the ranch. My dad still wanted to be active, so he was a millwright on the mill that's behind you [photo] there, in the early years.

Five Generations of Mining, Farming, Lumbering, Community Service

Swent: Where was that?

Clarkson: At Stibnite. At the Meadow Creek Mine. And he worked there until he retired back to Horseshoe Bend. Then he took on community activities. My grandfather Clarkson was a commissioner in Boise County in the 1800s, and then my dad was a county commissioner during the World War I period and just after World War I. I will give you some of that, some newspaper accounts.

Swent: So you have a long tradition of people who lived a long life.

Clarkson: I was the one to carry on in mining, and then son Curt. So it covers quite a period of Western history.

Swent: That's five generations of mining.

Clarkson: And farming and lumbering.

Swent: And community service.

Clarkson: Yes.

Swent: That's wonderful. Quite a heritage. Where were you born?

Clarkson: Horseshoe Bend. Boise County. And the other big mining area of Idaho was up in the Panhandle, the Coeur d'Alene District, Silver Valley.

Swent: That was later.

Clarkson: That was later. More lead and zinc than silver. But gold there, too. There was some early gold placer mining in that area.

Swent: Let's have the date of your birth, please. When were you born?

Clarkson: January 21, 1910. I'm getting close to eighty-eight.

Swent: Getting up there. And you were the youngest in the family.

Clarkson: Yes.

Clarkson Siblings Mary, Etta, and Samuel

Swent: Do you want to give the names of your brothers and sisters?

Clarkson: Okay. Our oldest sister was Mary.

Swent: And she is still alive, you said.

Clarkson: She's still alive. She married a Norwegian. He worked both-- well, when he came to this country from Norway, he started working in Utah mines and then on to Idaho, and then he became a homesteader, a farmer, but a lot of his later years work was cutting timber, a logger, for the mines, like Atlanta.

Swent: Atlanta?

Clarkson: Atlanta, Idaho.

Swent: And what was his name?

Clarkson: George. George John Jensen. He was known as John Jensen.

Swent: And she is almost 100 now?

Clarkson: She's past it. Her birthday is also in January. She reached 100 last January.

Swent: Wow!

Clarkson: So this coming January she'll be 101. Her mind is real sharp. She has to walk with a walker, and she has macular degeneration, like Edna, but she still has peripheral vision. And she raised a family of seven. Her family is all still living. And it was life in mining towns and lumbering and farming.

Swent: So she's still in Idaho.

Clarkson: Yes, in Boise.

Swent: And then the next one was your brother? Was he the second?

Clarkson: No.

Swent: Another sister.

Clarkson: Yes, Etta. Etta Frances. And then my brother.

Swent: And Etta, you said, has passed away.

Clarkson: Yes.

Swent: Was she married?

Clarkson: Yes. She also [chuckles] had a Norwegian husband--Henry Foss, but he was born in this country. My sister, Etta, didn't have a family. She was pretty well occupied all those years with nephews and nieces. My brother had a good-sized family, too.

Swent: What was his name?

Clarkson: Sam, Samuel, named after our two grandfathers. My maternal grandfather was German, and my mother was German, but she was born in this country. That family was all German. But my sister always worked. She was very, very active in community affairs. She and her husband. They went to California for her husband, Henry, to go to mechanics school in Oakland, and she worked while they were there. And then they came back to Idaho and bought a garage business in Horseshoe Bend; they owned that business, operated it for over fifty years. So they were community people, took part in all the community activities.

Swent: What about your brother, Sam? What did he do?

Clarkson: He was a rancher. In his teenage years he worked at logging camps in the Boise Basin mining areas. When my dad wanted to get off the ranch, my brother took it over, and he ran the ranch. But there's a lot of tragedy connected with that, so I don't know. The son, the oldest son, that was Curt's age, was the next takeover on the ranch. They had three small children. His wife was killed in an auto accident in Boise, going in for a dental appointment. That left the children orphaned. But they were raised--the maternal grandmother came to the ranch. They had two houses on the ranch. So she got the children raised along with my brother's help.

He lived as a bachelor in those years. They got the three children raised, two girls and a boy. But both of his sons were killed. I jumped around a little bit. Just eleven months after the mother was killed in an auto accident--nothing of her fault, I'll tell that--the son, her husband, was adding a bedroom for the house so that the girls and the boy each had a bedroom. They were putting in a thermal heating system in the

plaster. The fellow doing the plastering had a mixer for the mortar, and he hooked it up to 220 volts, to run the mixer, and they asked him to turn it on. Well, there was apparently wet ground. He went out to turn the mixer on, and he was electrocuted. So that left the children, three children, orphans.

Swent: So this was your brother's son and his wife, both of whom were killed.

Clarkson: Both were killed within a year. The way she was killed--she was on her way into Boise on a main street. There was a truck towing a forklift coming in the opposite direction, and the light changed, and it tried to stop. The truck was empty, and the whole thing jackknifed and the forklift crashed into her car, going in the opposite direction, and killed her. So that changed our family activities a whole lot. Jim Clarkson and his wife Carol were real ranch people, too. They were doing a great job in taking it over.

Another part of it was that my brother Sam's wife died of a heart attack when she was only just past fifty. That left my brother with--but most of his family had been raised by that point in time, so that's how tragedy changed the course of--

Swent: It seems like an awful lot of it in one family.

Clarkson: I often think about all the burdens that he had on that nice ranch.

Swent: But you said he lived to be eighty-five.

Clarkson: Yes, he stayed and kept the ranch going, kept it together so his grandkids could--one of the girls, the youngest girl still lives there. But they couldn't keep it up. It was cattle at that point; his main business was cattle. So they sold off all--except the homesite. Jim and Carol's kids still own it.

Swent: But they haven't been able to keep up the ranch.

Clarkson: No, they couldn't carry on. That was another unfortunate part of it. So that has been a sad story.

Growing Up in Horseshoe Bend, Idaho, from 1910

Swent: Well, yes. Let's talk about you now. So you were born, then, the youngest of four children and went to school?

Clarkson: Boise High School.

Swent: Where did you go to elementary school?

Clarkson: Horseshoe Bend.

Swent: There was a school there.

Clarkson: Oh, yes. It was a one-room school, and then, my birthday being in January, my mother--of course, it was in that period that we lost our mother. So that was a tragedy, too.

Swent: How old were you when she died?

Clarkson: I was just about six. I was just starting to school. She died from an accident, too. She was going to take care of an elderly neighbor lady, in winter conditions. The neighbor lived on another farm place about a quarter of a mile away, down off the [landform] Bench. Mother fell. It was icy, and she fell on the slick ice. Boise had the nearest doctor. It was not an easy thing to get a doctor. My dad rode into Boise on horseback and brought a doctor back. By the time he got back with the doctor, there wasn't anything he could do. Mother had an internal injury from the way she fell. She died soon after the doctor arrived.

Swent: Oh, my!

Clarkson: So then my growing up until my dad remarried, was with my sisters. I had that. When my dad remarried, he married a widow lady. She had a family of her own. She had lost her husband. And so that was a very successful marriage. They were married almost fifty years. She was a Hoosier. Her family had come west from Indiana. She was a great farm person, a wonderful cook. Then, when my dad took up mine work again, why, she was right along with him.

In high school years I had an excellent opportunity in summertime to drive truck for a trucking company, trucking to the mines in Boise Basin. It was called the Boise Basin Trucking Company. Two partners owned it. The first job I had

with them they put me on a truck hauling lumber out from a sawmill.

Swent: You said when you were in high school.

Clarkson: Yes. Summer, summer job.

##

Clarkson: That was really my first mine work opportunity.

Swent: When would this have been?

Clarkson: I started the first summer I was seventeen years old, 1927, and I worked for them during the summers.

Swent: How did you learn to drive?

Clarkson: Well, my brother-in-law had a truck. The older one, Jensen, and so he taught me the rudiments of truck driving.

Swent: What kind of truck was it?

Clarkson: Well, his truck was a five-ton GMC truck, and then the trucks that I drove for the trucking company were Garford trucks, especially built for the mountain mine roads and so forth.

Swent: What were they like?

Clarkson: Well, I'll show you. [shows photograph]

Swent: What kind of gears did they have and so on? How many gears?

Clarkson: Oh, a lot of gears [chuckles] because the special built part-- they had two transmissions in them. Each one of those transmissions was a four-speed transmission, so you could get the truck down to where it was just barely creeping along. Really, none of them was for highway driving. It was all mine roads and lumber mill roads.

Swent: How did you shift them?

Clarkson: There was two shift levers. One of the very important skills was what you call clutching because you had to synchronize the clutch with the speed of the gears. There wasn't automatics, so you used the clutch to get the drive train gears just in the

right synchronization with the engine speed so it slipped right into gear.

Swent: So you just had to sense when it was right.

Clarkson: Yes, yes. I proved myself good at that, so I had a good job with the trucking company up until the time we were married.

Swent: How much did they pay you?

Clarkson: Oh, it was so much a day, probably around \$4 or \$5 a day. But days could be anywhere from six hours to twenty hours [chuckles], like driving into Atlanta and driving into the Valley County back country and mines and the Warrens area south of the Salmon River. Some of the days were pretty long days.

Swent: Did you load the trucks as well? Did you help load?

Clarkson: Oh, yes. Helped, had help at the mine, and then the fellows, the bosses, helped to--there's the trucks [shows a photo].

Swent: Oh, yes. They were big ones.

Clarkson: This is back in the McCall area, Valley County.

Swent: This is the lumber--well, that's got hay on it.

Clarkson: We hauled hay because the mines always had horses.

Swent: These are tanks of some kind.

Clarkson: Those were for the Sherman-Howe gold mine. They were diesel storage tanks. They generated their power with diesel engines.

Swent: But you were driving this also.

Clarkson: Yes. The truck--as you can see here--would have rolled over lots of--almost to start with, with just a top-heavy tank. But this mining company was putting in a rod mill, and they had a carload of rods to move, too, so we used the rod mill rods for ballast.

Swent: To stabilize the tanks.

Clarkson: The tanks. I'm on the end here.

Swent: Yes. You've got big, high lace boots. What did you wear?
What kind of clothes did you wear?

Clarkson: Wool underwear when it was cold, long ones, and boots, wool socks and wool shirts. Summertime, then lighter clothes, of course.

Swent: Was this a year-round job?

Clarkson: No. No, early in the year in that high country, like there now, sometimes I would hold off on school for a month; I could get permission. I would still drive and do my homework and so on, so I got in sometimes even two months of extra work. And then in the springtime, I would get the full semesters in because the snow would not be gone enough to really start the mine hauling in the mountains, like hauling mine timbers.

And cordwood was another thing to haul because the mines usually used steam for heat, and also even some steam power.

Swent: When you went to school, did you live at home and drive back and forth? Or did you stay in town?--{not much driving in winter!}¹

Clarkson: No, I stayed with my grandmother part of the time.

Swent: Which grandmother?

Clarkson: Grandmother Clarkson. She lived in Boise, and she was a lot younger than my grandfather. I didn't have the opportunity to know my grandfather Clarkson. He died in 1914. So I was only four years old. But my grandmother--I regret that she used to tell a lot of stories about my grandfather and so forth. Well, I was always interested, but I didn't keep any notes.

Swent: Well, that's what happens. Did all four of you stay with your grandmother, then, when you went to high school?

Clarkson: No. My two sisters--When my mother died, they started working. My sister Mary was married, actually, before our mother died. She was still a teenager when she was married. So different times I stayed a lot, even though my dad usually had hired help on the ranch, I spent a lot of time with my sisters, doing work that I could do.--{sometimes not what I wanted to do!}

¹Mr. Clarkson added clarifying comments during his editing process. These are indicated with {} in the text. --Ed.

Started learning to work when I was pretty small, feeding the livestock and gathering the eggs and also those--kids had plenty of work to do in that environment.

"I Was Quite a Tinkerer"

Swent: And I guess you learned to build things pretty early, didn't you?

Clarkson: I did, because my dad in that community built several of the barns, and in that period he built a new house on the ranch. He was also a good blacksmith. We had a blacksmith shop for shoeing horses and keeping the wagons and the sleds and the haying equipment repaired. The blacksmith shop was one of my favorite places. I was quite a tinkerer [chuckles], to do things. Sometimes I irritated my dad. One time I recall that I took the cream separator apart and I couldn't get it back together [chuckles]. But it was curiosity that I wanted to see just how it all worked, and things like that. {Made my own toys!}

Swent: Were there a lot of cows to milk?

Clarkson: Well, in one period my dad and my stepmother milked a dozen cows because they made butter and made cottage cheese in a period of chickens and so forth because it was food for the chick. Of course, my dad was a good butcher, too. A successful ranch person needed all of those skills. In the fall, had a bunch of pigs and killed some for winter meat. Had a smoke house to cure the meat. And all such things as that.

And some of it, some of the pigs, the meat was sold, and when they had quite a bunch of cows to milk, they separated the cream and the creamery man came and picked up--in the milk cans--and that was added to the cash income, to sell the butterfat. So all of that was in my growing up period.

Edna and I were married when Edna graduated from high school in 1930.

Swent: When did you graduate?

Clarkson: In 1929, a year before. Then Depression years.

World War I in the Boise Basin

Swent: If you don't mind my interrupting just a bit. You didn't say anything about World War I. Did that affect you?

Clarkson: Yes, it did.

Swent: You were pretty young, of course.

Clarkson: My dad--because he was a farmer-rancher--was deferred, but right towards the end of World War I, he was on draft call. But that never happened. But my brother-in-law, Henry Foss, he was all through World War I. He was in the famous Rainbow Division. He came out of that okay. And then, of course, the courtship with my sister was after he was back from World War I.

There were some other family members that served, but, of course, in my family, they were all too young. But my dad--he was involved in various things, like the bond drives and community activity. He was on, well, I guess, it was called a draft board then and that sort of thing. But my grandfather, my maternal grandfather--they were German, and they got picked on some--but he was not a supporter at all of Germany. It turned out that he was--as a farmer, they had become pretty well-to-do, and someone was accusing my grandfather because he was German--my dad went to his defense right away, and he told these people off. My grandfather actually purchased more war bonds than any other person in the community. He spoke English with a pretty heavy German accent.

Swent: What was his name?

Clarkson: Philipp Zimmer. They met and married after migrating to this country. My grandmother was from southern Germany, the Bavarian area, and my grandfather was from northern Germany, the Prussian area of Germany, next to the Scandinavian countries. But he came first. He was seventeen, I think, when he came to this country. First worked on a railroad in New York, in the New York area, and then went to the gold mines in Idaho and then a homesteader and a farmer. There was tragedy in that family, too. My mother was the oldest of the family. She was born in Illinois, in a German settlement, before they came West.

Deaths from Diphtheria, Smallpox, Influenza

Clarkson: The cemetery tells this story. They had three boys. They were next younger than my mother. In a month's time, the three boys, ranged from eleven to fifteen years old, died of diphtheria.

Swent: Oh. Isn't that terrible?

Clarkson: Things like that. Smallpox and scarlet fever and things such as the pioneers had to cope with.

Swent: We don't even think about it now.

Clarkson: Well, one story I remember about my grandfather Clarkson leaving the mining area in California. They had an epidemic of smallpox. My grandmother told us how they couldn't even gather up all the ones that died from smallpox to bury them. I guess that smallpox epidemic must have been in the early fifties. It wiped out an awful lot of the people that had migrated to California for the gold camps.

Swent: Terrible. What was your mother's name?

Clarkson: Maria. But from a small girl she was known as Mollie. That was her name. Very few people actually knew about her given name. Curt's first grandchild, her name is Mollie.

Swent: How nice.

Clarkson: Named after the two grandmothers, Mollie Mae. Edna's middle name is Mae, and Margie, Curt's wife, her mother's middle name was Mae.

Swent: So that was a natural.

Clarkson: The new girl is Mollie Mae.

Swent: Was there any flu? Did the wartime flu affect you?

Clarkson: Oh, yes. That was one of my dad's community jobs during World War I. The flu epidemic that came. Because the nearest doctors were quite a few miles, so there was no doctor in the Horseshoe Bend valley area. My dad made the rounds to distribute medicine for flu victims in that period. A number of people died.

Swent: Even out there in Idaho.

Clarkson: In that area during World War I, flu epidemic.

Swent: I thought maybe you were far enough away that you didn't get it.

Clarkson: No, because it traveled faster than people traveled.

Swent: What kind of medicine was there?

Clarkson: Well, quinine was one of the medicines that I remember. And then just the medicines of the time. Aspirin, I guess. I remember that quinine was used a lot in the flu period. I think that was to stop the fever and what went along with it, probably some pneumonia that developed.

I remember that they were building a new headgate for the hydro power plant. One of the first power plants, hydro plants in the state, was built on the Payette River at Horseshoe Bend. The crew working on that headgate was all Basque fellows. They were living in tents. The flu epidemic really hit that group hard. Dad was involved in trying to get them in to Emmett or Boise. It was either a road trip or there was the train. In all my growing up years there was a train to the valley from Nampa, Idaho, where the main line branch was, to McCall, Idaho. Built about 1913 or '14; there was daily train service through that area. And during the winter months the train tracks had a fair bit of snow, but a lot of the roads were closed, either with snow or mud.

The Great Depression

Swent: Then you said that the Depression began to affect things there in the late twenties.

Clarkson: In the early twenties--

Swent: There was an earlier--I guess they didn't call it a Depression, but there was a slump of some sort after the First World War, wasn't there?

Clarkson: Yes. That was a depression. It affected rural people more.

Swent: Farm prices went way down.

Clarkson: Yes. Farm prices, and mining was affected some. Some people did have the opportunity to turn to mine jobs. For them, like in the Iron Range [Minnesota] country, mining was a summertime job, and woodcutting was a wintertime job for lots of mine workers. It was somewhat that way in the Northwest, too, like the Coeur d'Alene District and other areas in Idaho. Because all the cooking, heating, steam power and everything then was wood burning.

Then there was a period in the twenties that more coal started coming in from the Utah coal mines, and I remember that several farmers would go together and order a carload of chunk coal. They had to unload it by hand and weigh it out. Each family and town family, like the storekeeper and the hotel people, they would participate in this getting a carload of coal.

Swent: And it came up from Utah.

Clarkson: It came up from Utah. The Union Pacific, like the railroad from Nampa to McCall. That was called the Oregon Short Line. There were several branch railroads in different areas like that.

Swent: Was your father's farm activity affected by this depression in the early twenties as well?

Clarkson: Oh, yes. Yes. Then the federal farm loan bank came into being, after World War I. My dad administered loans in that area. But it was a struggle. And then the 1929 crash, next-- they were just out of it fairly well, and the worst Depression came. And that affected mining. Gold was still \$21 an ounce up until Roosevelt's time, when he turned off the gold standard, and gold went to \$35 an ounce. That generated like the Mother Lode country in California, Colorado. That started a lot of new activity for mine work. That's the time that I really saw an opportunity. Grass Valley was coming to life in 1935. The old mines were opening up, so that really was the time that I got in on new gold mining.

Swent: You graduated from high school in 1929, and you were still doing the trucking job.

Clarkson: Yes. Well, the Depression then caught up the truckers, and then I decided to get married. We picked out a new Ford

roadster that I had enough money to buy, coming from the trucking company wages. [We were] dreamers.

Swent: You worked full-time at the trucking company after you graduated from high school?

Clarkson: Yes. That was starting the summer of 1930.

Swent: What happened from 1929 to 1930?

Clarkson: Well, that winter I worked some for the trucking company. That wasn't driving work. It was shop work, overhauling the trucks and doing rebuilding and so forth. That was good experience, because we built up new beds for the trucks, re-equipped them to handle logs and lumber better. But when it came the time to get married, they couldn't pay me. That was depression. The Ford that we had picked out, when we got married I couldn't buy, so that was when we got married, and I fortunately went to work for Edna's dad in the mine that he was superintendent of. That's where the Belshazzar came into it.

Edna Evans and Courtship at Dances

Swent: I see. How did you meet Edna?

Clarkson: Well, my sister Mary--Edna's dad was foreman of the Quartzberg Mine.

Swent: Quartzberg?

Clarkson: Yes. That was the Gold Hill Mine. Quartzberg was the town.

Swent: Gold Hill Mine, okay. What was his name?

Clarkson: Parley Evans. Welch ancestry. His family migrated from Wales. He was the youngest of a large family. They were brought to Utah first and then southeastern Idaho by Mormon missionaries, and so they were a Mormon family. But Edna's dad didn't stay. He went with mining because in Wales there was coal mining. Her dad's career was all mining. But he didn't stay a Mormon. Her mother was raised as a Christian Scientist.

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Swent: How did you meet Edna?

Clarkson: My sister, my oldest sister--when the Evans family was at the Quartzberg, my sister was a teenager. It was a summertime job, but she worked for Edna's mother. Her mother ran kind of a boarding house at the mine for some of the men, so that's how the family acquaintance started. When we were all small kids, Edna's mother would bring all of her family, five, over to visit my sister and also she visited on the ranch with my folks. Usually, they would come over when there was a dance. Then they danced on Saturday night and maybe stayed for a week. But the friendship was for the most part with my older sister, Mary. Always good friends with the Mrs. Evans. Just coming over the mountain down on the river, the kids could even--It was a distance of twelve or so miles by the wagon road going over the high ridge. Their brothers could walk it, and there was a peddler that brought groceries over. Sometimes their mother would catch a ride with the peddler on his wagon, and the kids would walk.

Swent: Twelve miles?

Clarkson: Twelve miles.

Swent: Quite a walk.

Clarkson: It was a crossing over to the opposite side of the summit there. So that was a lot of--some growing up, like in those years. Later one of Edna's brothers had the same classes in high school that I had, but Edna didn't pay any attention to me until later on. She had her girlfriends, and I would see her occasionally, and I knew who she was, but I had more contact with her brother, Howard. They were both in the same class year. He was a year behind me, but I had him in mechanical drafting and woodworking shop, and I think he was in an algebra class one semester that I was in the same class.

So we knew lots of the Boise Basin people because of my dad's activities there as commissioner and so forth, and during the period that my dad was a widower, I got to go along with him a lot. I would have the opportunity to go along with him, so--actually, I probably over all knew more people in the Basin.

Swent: The Basin?

Clarkson: It was the Boise Basin, but we always said the Basin. There were three towns on the westside Basin. There was Quartzberg and Granite Creek was a little village in between. Placerville, the other, was one of the major towns, and Idaho City was the county seat, and then three others. There was Centerville and New Centerville and Pioneerville. New Centerville was a railroad, logging railroad town, with the Boise-Payette Lumber company. And then Grimes Pass. Grimes Pass was a mining camp. The latter towns all along Grimes Creek.

Swent: What sort of things did you do for dating? What sort of dates did you have with Edna before you were married?

Clarkson: Well, it started at a dance early that year. One of my stepbrothers, my oldest stepbrother, was courting Edna's older sister, Eleanor, so that was my opportunity.

Swent: Where did you dance?

Clarkson: I think that dance was at Placerville, in the Oddfellows Hall. That was the dance place there.

Lodge and Church Activities

Swent: Did your father belong to any lodges?

Clarkson: Yes, he belonged to the Oddfellows. My grandfather was a charter member of the Masonic lodge in Idaho City. In later years, he dropped out of that, but my dad maintained his Oddfellows membership. He was responsible for building an Oddfellows Hall in Horseshoe Bend, and that was the dance hall there, a two-story hall, which is typical there. That existed there for a long time but it's nonexistent now.

Swent: Did your mother or your stepmother--were they involved in lodge activities as well? Of the women?

Clarkson: They were involved. Both my sisters were Eastern Star. My younger sister, that died, she was real active in White Shrine, as well as the ladies' club activities. My stepmother was real active in the local ladies' club activities, things like that.

Swent: As a youngster in high school, did you do any of that, too?

Clarkson: No. No, I was too busy working.

Swent: What about church activities?

Clarkson: My German grandparents were Lutheran and active. My grandfather and grandmother had in the old country their charters or whatever it was, when they were confirmed. In later years the family was all Methodist associated. But my grandmother Clarkson was Irish. She was raised and educated in Catholic schools before coming west. There was just one sister that stayed in the Catholic order. My grandmother and all of her family--because the Methodist Episcopal Church, other than Catholic, was the dominant church--in the mining camps was a preacher that went around from one church to another.

Swent: Circuit rider.

Clarkson: Circuit rider. That's the term for it. Our affiliation continued. Palo Alto was United Methodist and then problems in the church there. We switched to Presbyterian. Now all of our family are active in the Presbyterian church. Edna and I made a trip and took one of our granddaughters. It was a business trip, too, for me. To Scotland. We went to visit the original Presbyterian cathedral in Edinburgh, St. Giles Cathedral. And also we did some searching on Edna's heritage in Wales. But I also looked for the Clarkson name in Scotland and found--in what they call the Armory in Edinburgh I found the Clarkson name, going back to the 15th century in the armory records. But our branch--two brothers came from Yorkshire, England, before the Revolutionary War to Virginia. Virginia is where the family actually stemmed in America.

Flying Lessons and a Wedding 4,000 Feet Up in the Air

Swent: Where were you and Edna married?

Clarkson: That's a story. We were married over Boise. I was taking flying lessons. I just had my first license--student.

Swent: What made you want to do that?

Clarkson: Well, when airmail came into play, I was in high school, and I always dreamed about flying. I was engrossed in it. I had to

take some flying lessons while I was in high school. I had dreams of being an airmail pilot.

Swent: Charles Lindbergh was a big hero?

Clarkson: Yes. He was the hero. And so when the fellows at the airport --my instructor and some other friends--found out we were going to get married, they said--we'd just gotten a brand-new Ryan Brougham, which was billed as a sister ship to Lindbergh's plane. And they were promoting it for barnstorming rides and so forth. It was drawing a lot of attention. So they suggested that we get married in the plane. We were going to be married at home, with Edna's mother and dad. And this came up. And so we got talked into it. Well, then the family minister--when we put this proposition to him, he refused to fly, and so there was a well-known justice of the peace, Judge Adams, in Boise, that was a family friend, too. I think Edna's mother handled that part of it! Judge Adams said, "Sure, I'd love to do that." So we were married in a sister ship of "The Spirit of St. Louis," over Boise. Only four could ride in the plane, so the pilot, my instructor and one of Edna's cousins was the witness. The family group watched us from the ground. The pilot took us up over Boise to probably about 4,000 feet. Then for the ceremony, he cut the engine back and just glided, so it was all quiet. And then landed with us. So our wedding reception was with the family [chuckles] on the ground. We didn't talk about that for a long time.

Swent: Oh, really!

Clarkson: Well, we thought we were kind of silly to do something like that. So that's that story.

Swent: I thought probably the airplane people used it for publicity. Didn't they make a big thing of it?

Clarkson: The flying school and the local paper, the Idaho Statesman, had quite a story on it.

Swent: I would think so.

Clarkson: And our picture, and all of that.

Swent: That's pretty exciting.

Clarkson: So now that's sixty-seven years ago.

Swent: Well, I guess it worked pretty well, didn't it? What was the date of your marriage?

Clarkson: August 5, 1930. We used to say that we were married during the Depression, when two could live cheaper than one. That was kind of it. At least it didn't cost any more for two of us. Then I went to work for Edna's dad at the Belshazzar Mine. A year later a disastrous forest fire burned out a lot of the Boise Basin and shut down several of the mines. Then I headed for Stibnite. That was the summer of 1931.

But we had saved up enough money--the job at the Belshazzar--the next spring, after we were married, we had enough money to buy our Ford.

Swent: You finally bought the Ford. What was it, a Model A?

Clarkson: Yes. Model A.

Working at the Belshazzar Mine, 1931

Swent: What kind of work were you doing at the Belshazzar?

Clarkson: Well, I got to do a little bit of everything. I started underground, just as a machine man's helper, mucking and timbering. And then there was an incline shaft underground, between two levels, and I got to run the hoist for that. Run the hoist and pull up the ore skip and then tram it and push the mine car to the outside.

Swent: Oh, they were the hand tram cars.

Clarkson: Yes. I could ride it, coasting, the three or four hundred feet out to the portal. Then there was an aerial tramway that took the ore from the mine down to the mill. That aerial tramway was about a half mile long. The bucket carried one car. One car of ore at a time. And at the bottom it had to be trammed around a tramway to the mill, and a mill man took care of that.

Then, later on, I got some of both. Working in the mill, helping the mill mechanic do repair work. Come spring and good weather I got to rerun a stack of stored concentrates over a Wilfley concentrating table--an upgrading process prior to shipping to a smelter in Utah.

Swent: What kind of mill was it?

Clarkson: It was all a gravity mill.

Swent: Stamp?

Clarkson: No, a ball mill. Where Edna and I lived was in the old stamp mill that had been abandoned and replaced by a new mill, with a ball mill. Like that picture I showed you. There was two lower rooms of the building. There was a cleanup room and storage area for the stamp mill that was still standing. The old stamp batteries were still standing out in the open, behind our living quarters. I fixed up these two rooms to make it a bedroom and a kitchen-living room. So our last year at the Belshazzar, that was where we lived.

Swent: How much were you paid?

Clarkson: Oh, that was probably \$4 a shift, seven days a week. It might have been three and a half to start with. Then a little raise to \$4.

Swent: Any benefits?

Clarkson: No benefits. Except a place to live and getting our mail delivered up to us from Placerville. Oh, occasionally we could have a meal in the cook house--because they had a cook house by the bunk house, where most of the men stayed. There was just three or four families that lived at the mine. Edna's dad always ate in the cook house because the family home was in Boise. They moved to Boise when the kids were getting close to high school age. But Mr. Evans always lived at the mines. They had to because nowhere in the Basin was there a high school, but the various towns had their grammar schools, of course.

Swent: What did Edna do up there then?

Clarkson: Well, she lived the camp life with friends.

Swent: I'm trying to think. If you only had two rooms, she didn't have a lot of housework, did she?

Clarkson: No. She looked out for her dad because she was--well, one of her brothers worked at the mine, too, her older brother. He was single. So she looked out for her dad. And she liked to

go home to Boise, to be with her mother, every time she had an opportunity. Things like that.

Swent: Did she do the washing?

Clarkson: Oh, yes. In a washtub. I built a cellar, underground cellar--no refrigerator. After we were married and set up our family life there, why, we had to hustle to put in our staple groceries for the winter, so I built a cellar in the bank there, using some mine lagging and things like that. Put a roof and a doorway going down into it. So then a big trip to Boise. We had to use credit to buy our winter supply of flour and sugar and lard and all of the things that went along with it. But then the wholesale grocery store, they gave us credit. Every two or three paychecks, why then, I would send in a payment. We established a bank account and all of that for saving.

Swent: So she was doing a lot of cooking then {and lunch making}.

Clarkson: Yes. Seven days a week. And I had to take a lunch, of course. My time away from the house there was about ten hours a day.

Swent: You didn't come home for lunch.

Clarkson: No, no.

Swent: You carried a bucket.

Clarkson: I always carried a lunch bucket. My first job at Stibnite was underground, in a long tunnel being driven. There I was--with the walk and everything--I was away from home twelve hours a day. Because the tunnel at that point in time was in almost a mile to the face, and there was a walk in, but we rode back out on the train.

Swent: And your shifts began after you were at the face?

Clarkson: Yes. And then I had a mile and a half walk from the portal home because we lived at the Meadow Creek Mine site. That's where I built our cabin. But the tunnel was at Monday Camp. It was a tunnel that they were driving through to tap the shaft of the Meadow Creek Mine on the 400-foot level. But the tunnel was never completed.

Then, from the tunnel job, when the new mill was built, I had to lay off for a while, waiting for the mill to be finished.

Swent: Did they allow you still to stay there?

Clarkson: Oh, yes.

Swent: How did you happen to get the Stibnite job?

Clarkson: Well, my dad was there first. That was a part of it. I sensed at the Belshazzar and Quartzberg that there would be a lot of fellows out of work because of the forest fire that burned Quartzberg and burned Grime's Pass, and so my dad--he knew about the fire tragedy, and just as soon as I could get off the fire crew, I headed for Stibnite. My dad of course knew the mine superintendent. I was one of the last fellows to be hired there in that period of time. Others came in rustling, so I was lucky.

Swent: How did you get up there?

Clarkson: Our Ford. I'll show you a picture of it.

Swent: Did you have telephone communication between the places then?

Clarkson: There was pretty good telephone service in the Boise Basin with the mining company, Placerville, and the connection to Boise. But Stibnite was more remote and all Forest Service. A phone call into Stibnite had to be relayed about three times to get a call through because it was all hand-cranked phones, and they could only carry so far. So from Stibnite it was to the Yellow Pine operator, and the Yellow Pine to the Landmark operator [chuckles], and the Landmark operator to Cascade. Cascade was the rail head. Had telegraph service and telephone service and all of that.

Swent: I presume you didn't have a phone in your house at the Belshazzar, did you?

Clarkson: The only phone was in the office. Well, one time with this we had one of the funny experiences. We had our first radio at the Belshazzar. There was a snowstorm that knocked down--we had a wire antenna for the radio, and the snow knocked down the antenna across the telephone line, and all at once a voice started coming into the house. Edna had the radio on. It was Edna's dad talking to the postmistress in Placerville because--

the post office was also the general store, and he always called for supplies to be brought out and for anything about the mail. The mail and supplies was brought up from Placerville in winter by a fellow with a bobsled and a team of horses. And so we heard this whole conversation. I happened to be home because I was on the night shift, and we heard the whole conversation on our radio. It took us a little while to figure out what happened. Then we had that as a big joke on our dad. We heard his conversation with Henrietta. She was quite a person. She was one of the characters on the other end of the line. She usually had a joke to tell or some gossip to tell or something like that. Too, she had been Edna's teacher in grammar school.

Swent: The telephone operators knew everything, didn't they?

Clarkson: [chuckles] Oh, yes, they did. Like at Horseshoe Bend, we had a telephone on the ranch. As well as electricity. One of the first power plants was built in Idaho, and we were close enough--well, another reason for that: One of dad's brothers, Bert, was an electrician, and he worked for the power company, and with his help they built a line from the coal mine main. The ranch house was just a half mile from the coal mine, so my dad's brother instigated getting a line to the ranch, thus we had power there, probably about 1912, in that period, 1914. I was just a baby at that time.

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Clarkson: The only service that the power provided was just for lights. Didn't have any electrical apparatus anyway.

Swent: What kind of stove did Edna have at Belshazzar?

Clarkson: A wood stove.

Swent: She cooked with wood.

Clarkson: That was our first one. We bought a new one from Sears Roebuck, I think. Either Sears or Montgomery Ward. It was a nice little cook stove, with an oven.

Swent: And she washed by hand.

Clarkson: Washed by hand. I had to pack the water because we didn't have running water. There was a hydrant out a ways for the bunkhouse and so forth.

Swent: So she heated the water over the stove?

Clarkson: On the stove. For our bath, too.

Swent: Did you have an outside toilet?

Clarkson: Yes. We did not have inside plumbing. Not until our second tour at Stibnite. In the early thirties, that was all outside even for the bunkhouse and the cook house.

Swent: Pretty cold in the winter.

Clarkson: Yes. Had thunderjugs. And, of course, the guys in the bunkhouse, lots of vegetables and fruit for the cook house came in gallon cans, and the miners, they used the gallon cans to keep from going out in the cold. After a while, they'd pack them out to the outhouse and empty them.

That reminds me of a little story that occurred in Greenville about that, the outhouse for the mine. I'll tell that story when we get to the Standart Mine in Greenville.

Swent: So you got the last job at Stibnite.

Clarkson: I don't think another man was hired there until the following year.

Swent: And this was in 1931.

Clarkson: The new mill went onstream late in the year of 1931.

Swent: You know, this might be a good place to stop. What do you think?

Clarkson: It's up to you.

Swent: I think so. I don't want to get you too worn out today.

Clarkson: Oh, when I get started to talking, and get into the chain of events, I enjoy it. But I do have a tiresome voice maybe.

Swent: Well, no, but I think your throat may get a little dry.

Clarkson: I don't want to get you bored.

Swent: No, I'm not bored at all. I'm fascinated by every bit of it.

Clarkson: Curt hasn't checked in yet.

[tape interruption]

Swent: Okay. We've got a picture here of your Model A Ford, [reading] "Bob and Edna at the Belshazzar Mine, 1931." Rumble seat.

Clarkson: Trunk on the back.

Swent: Wonderful. Black, I guess.

Clarkson: We called it a mother-in-law seat. No, it was blue with red wheels. And a tan top.

Swent: Very, very nice. How much did it cost you?

Clarkson: It was, I think, about \$580, something like that.

Swent: That was a lot.

Clarkson: Yes. Well, first we were just going to get a roadster. That was, I think, something over \$400. So we saved and scrimped. We were able to get the more sporty one that summer. It was new, the 1931 model. So we spent the winter dreaming about it [chuckles], when we could get our car.

Swent: Well, that's wonderful.

Clarkson: The company had a pickup truck. We were able to use the company pickup truck to haul some of our things and items like that. On a weekend, when there was a dance, with a company driver--it had screen sides on it, and a top over the whole length of the body. And to go to a dance or some event like a ball game, we would all pile into the back of it and fill up the seat and go to Placerville for the dance. {Edna's brother was usually the driver.}

Good Times and Social Life

Swent: I'll bet you had some good times.

Clarkson: And got back home again after the dance. Sometimes we walked. It was down off the mountain. It was five miles to Placerville. The girls had family friends in Placerville.

They could go to their house and get primped up for the dances. That was in moonshine days, too. But a girl, a woman, the girls--they didn't go outside, the parents just didn't permit that. Fellows, some of them had to have their bottle outside, drank some. It seldom ever got into a--but once in a while, some of the single men--a fist fight would erupt outside, but there was usually someone around to put a stop to [chuckles] things like that. The decorum for the ladies was pretty strict in those days. Of course, not getting involved in any of the drinking.

Swent: What sort of music did you have for the dancing?

Clarkson: Oh, good music. My sisters both played. Incidentally, my dad was a fiddler, a violin player, and he for years played for dances. My sister, Etta, played banjo. And Edna's folks had a piano in Quartzberg, and the mine crew would pick the piano up and take it to the dance place, but in Placerville, in the Oddfellows Hall, they had a piano there, and there was always a local band group that played. Usually consisted of piano, a saxophone, banjo and a violin, and drums. Always a violin and the piano. Sometimes an accordion in place of saxophone.

At Horseshoe Bend, for years, there was a Basque fellow there that played an accordion, and he always played in the dance group. There was always some group of good musicians. My dad played until arthritis made his fingers so he couldn't play the violin any more.

Swent: What kind of dances did you do?

Clarkson: Oh, the conventional dances. Waltz and then when we wanted to liven things up, it was a circle two-step, and then the two-step, and the square dances. There would always be someone that would call for a square dance. And the Scandinavians, they always liked to have a schottische. Usually an accordion player would play for a schottische. And the Irish. A lot of Irish families. Irish grog, I think they called it. It was a tapping. They'd do that individually, usually a man alone but sometimes a couple, too. It was usually a male dance. Grog was also used for a drink the Irish had. But I think they called it probably a grog because they had to have a few grogs to do a grog dance.

Swent: [chuckles] Well, you must have had lots of good times.

Clarkson: Well, entertainment had to be made.

Swent: Did you play cards?

Clarkson: Oh, yes, lots of card playing. The bunkhouse, of course, they played poker a lot. We played rummy and in later years bridge got started, but pinochle was probably the most popular up until bridge started taking over.

Swent: Did Edna play cards with the ladies?

Clarkson: Oh, yes. They played a lot, especially in Stibnite, after we went there in the thirties.

Swent: Bridge, I suppose.

Clarkson: Pinochle and then bridge. That was probably about the time that bridge started coming into the areas.

Swent: Poker?

Clarkson: Poker. In Stibnite in later years the men held what we called a Liars' Club, and they would play on a weekend. That was poker. We played all different forms of poker.--{dealer's choice}

Swent: Only the men?

Clarkson: Only the men, yes. The women didn't play poker. Theirs was bridge. That was their club and their pastime. But the men, the Liars' Club, we agreed to put a limit on it, because we didn't want anyone to plunge and lose beyond their means. But in the bunkhouse they played poker without any limits, without gambling limits. Some fellows who thought they were pretty good poker players sometimes took quite a beating from ones that were better poker players.

Swent: Was the pinochle and bridge played for money also?

Clarkson: No. It was always just pleasure. Then it made a lot to talk about afterwards. Who played what and all of that. At Stibnite in the early years, one of the warehouses that was built, we needed entertainment, so we moved and found another place to store the mine supplies, out of the big warehouse, and put up basketball baskets, so we had a basketball team. The surface workers usually played the miners, things like that. And also the way the ladies, the girls, were differentiated, was the surface worker wives and the miner wives.

For the basketball court, that also became the dance hall. For the first dance place there we cleared out the tables and benches in the cook house and danced in the cook house dining room. And Edna--I guess she had some lessons. But one of the fellows that played for the dances then prevailed on her to chord on the piano, so he helped her, and she got started chording, what we call chording on the piano, for the orchestra.

II STIBNITE, IDAHO, AND DEVELOPING THE REAGENT FEEDER, 1931 TO 1938

[Interview 2: December 8, 1997] ##

Pioneering Stibnite Metallurgy at the Meadow Creek Mine

Swent: We've had several weeks rest here. When we stopped talking, you were just going up to work for the Bradleys.¹ You might just explain the distinction between the Meadow Creek Mine and Stibnite and Yellow Pine. We use all these names sort of interchangeably.

Clarkson: Well, the Meadow Creek Mine is the original underground mine with the adit and shaft right near the mill site. The ore came out of the Meadow Creek Mine, which was an underground mine, and it was an underground shaft, served by the adit tunnel, and the ore came directly out and into the ore bins of the original mill.

The Yellow Pine Mine was the later operation, about two miles north, downstream from the Meadow Creek Mine. That was drilled and explored with underground working, and then when tungsten was discovered, along with the antimony ore, then it was converted to an open-pit operation.

Swent: Okay. But at the time we're talking about--this was what? 1931?

Clarkson: Yes.

Swent: It was only Meadow Creek.

Clarkson: That's all.

Swent: And it was underground, and it was mining antimony?

Clarkson: Antimony and gold.

Swent: And gold.

¹Philip Read Bradley, Jr., A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia, Regional Oral History Office, The Bancroft Library, UC Berkeley, 1988.

Clarkson: Primarily it was gold in a sulfide, sulfide ore with gold and antimony the end product.

Swent: Is this a common association, gold and antimony?

Clarkson: Well, not too common---because the Bradleys pioneered the metallurgy to separate the antimony from the gold, the sulfide ore an arsenopyrite with also the presence of antimony. The difficult economic metallurgy involved was to separate the stibnite from the arsenopyrite into two separate concentrates that could be--

Swent: What is stibnite chemically?

Clarkson: Stibnite is--I can't remember the symbol, the element, the symbol. But antimony was Sb, and the iron portion of the ore was Fe, iron concentrate.

Swent: And that combination is called stibnite?

Clarkson: Stibnite ore.

Swent: You said they pioneered the metallurgy. Did they do that there?

Clarkson: No, the pilot plant work was all done in Berkeley.

Swent: Was that Pan American?²

Clarkson: No. Well, Pan American was involved in it later on. Dee [Dmitri] Vedensky was associated with Pan American. And then Pan American was, I think, was an outgrowth of Max Kraut's development, the Kraut flotation machine that later, as I recall, later the Kraut flotation machine became the Pan American flotation machine. Max Kraut was one of the early pioneers because--in that first metallurgy, separating the antimony from the iron, carrying the gold. Kraut flotation machines were pioneered in the stibnite mill.

And a fellow with Bradley then that was in charge of designing all the mills was Lloyd White, Lloyd C. White.

Swent: He was a Bradley employee.

²Plato Malozemoff, A Life in Mining: Siberia to Chairman of Newmont Mining Corporation, 1909-1985, Regional Oral History Office, The Bancroft Library, UC Berkeley, 1990.

Clarkson: Yes.

Swent: I'm not sure what the connection was between Pan American and Bradley.

Clarkson: Well, it seemed to all come out of Berkeley, the association, because Pan American was a Berkeley company.

Swent: But it was separate. It was not a Bradley company.

Clarkson: No, it was not a Bradley company.

Swent: They just worked together a lot, I guess.

Clarkson: And one of the early metallurgists on that work was a Berkeley professor, Professor Duschak. As I remember, he was responsible for the original flow sheet design, flow sheet and so forth, and that included the cyanide mill for cyaniding the gold concentrate. But in practice that turned out to be a failure, so they shut the cyanide plant down and carried on the operation by shipping both concentrates. The antimony concentrates were sent--some went to Belgium. The only antimony refinery was in Belgium. And another one was built in Texas to process some of the Latin American antimony.

Swent: This was in the thirties?

Clarkson: That was in the thirties.

Swent: Where were the gold concentrates sent?

Clarkson: To Garfield in Utah.

Swent: Who owned that?

Clarkson: That was Kennecott. I think Kennecott owned Garfield then.

Swent: I think so.

Clarkson: I'm not certain about that, but there was two companies; U.S. Smelting and Refining was operating in Salt Lake then. And then I'm not sure at that point in time which company, what the company was that owned that.

Swent: All you did there at Meadow Creek was just concentrate.

Clarkson: Yes. And the successful metallurgy on this was worked out by a fellow from Denver, to successfully, in flotation, separate the two concentrates.

Swent: What was his name?

Clarkson: I just--

Swent: Brinker? Was that Brinker?

Clarkson: Fred Brinker.

Swent: Now, I'm not quite clear. Pan American did--

Clarkson: The early. They were involved--also Pan American built the Nickels--in the cyanide mill section, the iron concentrates had to be roasted. The roaster was a Nickels Harshoff roaster, which was manufactured by Pacific Foundry in San Francisco. It was a hearth-type roaster. Pan American built the burners for the roaster. That was a Pan American product. The oil burners that heated the roaster. Other San Francisco firms, all tied in with the Bradley operation. {Merrill-Crowe precipitation process equipment was used for the final recovery of the gold.}

Swent: Cyanide was an old technology. That had been around for a long time.

Clarkson: Mother Lode ores--the concentrates could be directly cyanided when the only requirement was fine grinding, but the stibnite ore was an arsenopyrite. The sulfur and the arsenic had to be roasted off before it could be cyanided. But the problem that they got into was not solved in the beginning, and in the course of roasting the gold fraction of the concentrate became coated with antimony. That reduced the recovery in cyaniding the gold because the roasting, as I say, coated the gold and then the cyanide wouldn't touch it.

Swent: Oh, so that was the main problem.

Clarkson: That was what brought about the failure. But the old roaster that was shut down in that period was never used until the metallurgy was developed on smelting the concentrate. Then the roaster was resurrected and became a part of the new smelter that was built in the late forties. There was another one of the same type; a new one was added so the two roasters were required for the new smelter.

Swent: What is the difference between roasting and smelting?

Clarkson: Roasting roasts off the sulfur and recovers the arsenic, in that instance, so that the roasted concentrate going to the smelting operation was free of sulfur. From that process {calcining} in the smelter, it went into an electric furnace,

which is a modern electrode furnace, and that was the melting point in the smelter operation.

Swent: The smelter probably needs a higher temperature than a roaster?

Clarkson: Oh, yes. Coming back in that period of time, that's where Dee Vedensky came back into the picture because by that time, from the early Berkeley days, he had been with the M.A. Hanna Company. He was a consultant and became an officer of M.A. Hanna, vice president in charge of metallurgy. After Stibnite, some of the Stibnite crew developed the electric smelter for the Riddle, Oregon, nickel job. On that job they smelted the entire ore. There was no concentration step in the ore at all. That was all electric smelting; low-cost power made it feasible.

Failure of the Cyanide Plant

Swent: I'm trying to get a sense of the continuity of things here, leading up to your reagent feeder, of course. When you went up there first in 1931, what were you hired to do?

Clarkson: [chuckles] Well, I was hired as a mucker. That was the only job available. But the mill was under construction.

Swent: Oh, it wasn't operating yet.

Clarkson: Then, in the overall plan, they were driving a tunnel from the site of the Yellow Pine Mine. It was to be a mile-and-a-half tunnel, to tap the shaft at the 400-foot level of the Meadow Creek Mine. {Tunnel known as the Monday Tunnel.}

Swent: The tunnel was being driven 400 feet underground?

Clarkson: No, it was being driven from the stream level. The drainage there flowed north. It was a mile and a half downstream that they were driving a tunnel for a drainage tunnel and also future haulage tunnel, which would have been, had it been completed, was about a mile-and-a-half tunnel that would have intersected the Meadow Creek shaft at the 400-foot level. That was in future planning, but when they started the new mill and the cyanide plant failed, they decided not to spend any more money on the tunnel, so they shut the tunnel down. It was about half completed.

And so when the mill was completed, there was a little waiting period there. I was still a mucker on the tunnel crew. When the mill started up, I got a spot in the mill.

Swent: I see. So how much were you aware of what was going on in the mill at this point?

Clarkson: Well, I became very quickly aware that there was a lot of serious problems and things were not working right. Some heads had to fall. The fellow that was mine foreman for the Meadow Creek Mine was also a metallurgist. He became the mill superintendent. He was Leonard Yundt.

Swent: He had been the mine superintendent and then he became--

Clarkson: At startup, he became the concentrator superintendent because-- that was planned that way. When the mill was ready to run, he would become mill superintendent. Then things--the metallurgy didn't work out at all. Flotation concentrates were going down the tailings because they couldn't handle them and so forth, so his was one of the heads to be let go.

Swent: Why did this happen?

Clarkson: Because nothing was working right at the mill. All kinds of problems. The cyanide plant was not working, and the flotation was not working.

Swent: When you say "not working," what do you mean?

Clarkson: Well, it was--the flow sheet and reagents were all worked out in the pilot plant.

Swent: And the pilot plant was in Berkeley?

Clarkson: In Berkeley. The so-called pilot plant work was done at the College of Mines at Berkeley. So the metallurgists--that included Dr. Duschak. He was called in because it wasn't working. The concentrates couldn't be handled, the flotation couldn't be controlled, all the reagent scheme just didn't work. And then he sent up another Russian fellow. Fittinghoff was his name. He was one of his students at Berkeley.

That's when Fred Brinker came into the picture. He developed--he had worked with this process, so he came in and worked for several months and changed the whole thing around. It just reversed. Because they were trying to float the iron concentrate first, differential flotation, and then the antimony. He reversed that to float the antimony first and

then the iron, the gold concentrate second, in the secondary flotation stage.

But still the cyanide plant was a failure, so that remained shut down. When Leonard Yundt, the original mill superintendent, was let go, the cyanide plant had a superintendent, one for the cyanide plant and one for the flotation plant and the grinding section. Hal Lewers was moved up from the cyanide mill operation to replace Leonard Yundt. But still the problems continued, and the economics of the ore --so the next head to fall was the general superintendent that started out with the operation. His name was George Worthington.

Swent: I don't understand. If the process--if the chemistry of the process isn't working, how does firing the superintendent improve things? What's the connection between--

Clarkson: Well, wrong decisions. They didn't just solve the problems that existed. So the next one to replace George Worthington was Lloyd White. He was responsible for mill design and all of that, working out of the San Francisco office. He was sent up to replace these people and solve the problem.

Swent: Well, if they were following a plan that was given to them by a research lab--where was the problem?

Clarkson: Well, I guess that's the way things worked. Someone had to be the fall guy, and so each time, someone was the fall guy and got terminated. Lloyd White remained as manager through the thirties. Then Lewers quit because--that's when Lloyd White came in; two administrative people left. But Lewers left because he was offered a better and a growing, successful job. He was offered a job heading up the Idaho-Maryland mills in Grass Valley, so he left--I think he left Stibnite sometime between 1933 and 1934, to go to his new job in Grass Valley. I stayed on until 1935.

Working as Ball Mill Operator

Swent: When you left the mucking job in the tunnel and went to work in the mill, what was your job then?

Clarkson: Ball mill operator. Two operators. The ball mill operator on a shift and the flotation operator.

Swent: So was this your first experience with flotation?

Clarkson: Yes, it was.

Swent: And what sort of equipment were they using? Maybe just take me step by step through the process.

Clarkson: Starting out--I'll skip the--well--

Swent: No, don't skip anything.

Clarkson: The mill started out with--the crushing plant was two-stage crushing.

Swent: What kind of crushers were they?

Clarkson: Blake-type jaw crusher.

Swent: And this was right at the entrance to, the exit from the mine, you said?

Clarkson: Yes.

Swent: Right there at the adit.

Clarkson: Tram right from the mine to the primary crusher. And the secondary stage of crushing was a Symons cone crusher. And then that to a Hardinge ball mill.

Swent: Were there belts, conveyors?

Clarkson: Yes, belt conveyors between the crushing stages.

Swent: And what were they made of?

Clarkson: Let's stop and look at the picture.

Swent: Right. But then we have to get it in words to get it on the tape, too.

Clarkson: [away from the microphone] This [demonstrating] is the Meadow Creek Mine, and--

[tape interruption]

Swent: We're looking at a nice, big picture on the wall. Meadow Creek Mine and Mill. Stibnite, Idaho. George Worthington, Superintendent. Is there a date there?

Clarkson: Yes.

Swent: 1931. Gold and antimony. Okay.

Clarkson: The mill was under construction. The tramway hadn't been built yet, but came from this out to this bin here. The bin was built, but the tramway hadn't been built for the primary crusher. Then the conveyor belt for the secondary crusher, which is--

Swent: The conveyor belt goes up.

Clarkson: Yes.

Swent: And then drops it down into the cone crusher.

Clarkson: All gravity through the crusher. And then the next conveyor belt, from the secondary crusher to the mill ore bin. This building was the concentrator building, grinding and flotation. This building is the cyanide plant building. But conveyor belt between the concentrator to convey the concentrates, the iron concentrates, iron-gold, Fe-Au, to the cyanide mill.

Swent: The cyanide mill was right there at the lower end, so they could just close it down without interrupting the circuit.

Clarkson: Yes. Use it for a storage building for the concentrates.

Swent: What is the car that's on the edge of the photo there?

Clarkson: This?

Swent: Yes.

Clarkson: I think that was the company car, which was a Star Durant or a Plymouth. One of the first cars offered that had hydraulic brakes. I remember that. And then this stretch here, where all these stumps are showing, that was being cleared for an air strip.

Swent: For your air strip. I was going to ask about that. We'll have to get the flying in there, too. By this time, you've been flying quite a little.

Clarkson: Well, I was still a student at that point. I worked there. Every opportunity that I--later on--that I had to fly with mountain pilots to get an hour or two of training, I always kept working away at that. That's the way it was all through the thirties. I wasn't making any use of it. It was just every opportunity I'd build up some time and experience. Then it wasn't until the forties that I was really qualified to make good use of it.

Swent: When did you get your license?

Clarkson: Well, the first license I got in Grass Valley, after I went to Grass Valley, because the Idaho-Maryland owner built his own air strip on the Idaho-Maryland. It was known as the Loma Rica air strip, on McBoyle's ranch, Errol McBoyle.

Swent: There's a Loma Rica strip still there.

Clarkson: Well, yes. And that was McBoyle's private air strip. And his home was the ranch home. I used to make trips up there occasionally to take supplies to their home. They had a dozen, at least a dozen dogs, and they had a caretaker for the dogs.

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Swent: So let's get back now--so the ore is going to the Hardinge ball mill, and you were the operator of this ball mill. It operated around the clock? Three shifts a day?

Clarkson: Yes, three shifts. The classifier was a Dorr Company, closed circuit grinding and a Dorr classifier.

Swent: And your job was just to see that the ball mill didn't get--

Clarkson: Kept it under control, feed the right amount of ore.

Swent: And how was the ore fed in? Just continuous feeding?

Clarkson: No, it was a plate-type feeder, a drum feeder. Let me change that. It was a drum-type feeder. The ore rested on top of a rotating drum that was ratchet-activated. It could be--the rate of feed could be controlled by the ratchet on the drum.

Swent: Did you do that manually?

Clarkson: Yes. Most everything was manual control. And then, from the grinding circuit it had to be a fine-ground ore to the flotation, two flotation circuits. Density controlled the grind.

Swent: And what kind of reagents were they using?

Clarkson: Well, the reagents selected for that type of flotation. One circuit, one flotation circuit had to be an acid circuit; and the next one, an alkaline circuit. The flotation reagents were all pretty common reagents, but the alkalinity had to be--Fred Brinker's process was a patented process. He rearranged the reagents, but just roughly speaking, the caustic soda had to be used, but in order to use that, we made "Clorox" in a tank in the mill. That was made from caustic soda and chlorine gas, so rather than feeding the caustic soda, it was fed as a liquid "Clorox." We had plenty of "Clorox" to take home, to wash clothes with, things like that.

And then xanthates and the flotation oils was cresylic acid and pine oil.

Swent: And were you controlling this manually, adjusting it?

Clarkson: No. That's where I started figuring out a better reagent feeder. The old--

The Need for a Better Reagent Feeder

Swent: That's what I want to get to. What was it before you came along?

Clarkson: The shop made--the feeders for the larger flows, were shop-made.

Swent: There, in your own shop?

Clarkson: No. The Bunker Hill shop. They came down from Bunker Hill.

Swent: Which was also a Bradley--

Clarkson: Yes. The oil, the precision feeding was a Kraut feeder, developed by Max Kraut, along with the Kraut flotation machine.

Swent: And how did that work?

Clarkson: It was a kind of a drum-like wheel that carried up--then it was a finger that picked the oil film off from the drum, around a little stream, a little dipper would dip in and take a dip out of the stream, and that frequency could be adjusted, but it was very difficult to maintain accuracy with it.

The larger feeders were just bucket-, cup-type feeders, tripping over a bar that spilled the bucket into a trough that carried it away.

Swent: I'm envisioning something sort of like a water wheel?

Clarkson: Yes.

Swent: A Pelton wheel kind of thing?

Clarkson: It was something. Denver Equipment was also building a feeder of that type called a Geary feeder.

Swent: Was Brinker working with them?

Clarkson: No, no. He wasn't.

Swent: You said he was in Denver, right?

Clarkson: Yes, he was a Denver consultant.

Swent: Working independently.

Clarkson: Yes. And the flotation machines. The primary flotation machines were Kraut flotation machines. The secondary machines were M.S. Machines, Minerals Separation. I can't recall the names of the principals now, but they were a Salt Lake company.

And then on down the line. The thickener mechanisms were Dorr, also Dorr. And the filters were Oliver filters, drum filters. That's also Berkeley-Oakland.

Swent: Developed in Grass Valley, I believe?

Clarkson: Yes, yes, that's right, where they started. Then in late years Oliver was bought out by Dorr.

Swent: By Dorr. It became Dorr-Oliver.

Clarkson: Right.

Swent: So there was kind of a variety of equipment there.

Clarkson: Well, predominantly what was popular and marketed in California, the Berkeley-Oakland and San Francisco area, like the Harshoff furnaces. Of course, the Hardinge ball mill was an East Coast company, like Dorr. And Hardinge--he was quite a noted man with the Hardinge mills.

Swent: Were you responsible for the feeding? Was this something you had any discretion over?

Clarkson: No, the float operator was the boss. He told--because he had to determine whether I was giving too much or too little.

Swent: How often did they test? Check it?

Clarkson: Well, all--

Swent: Continuously?

Clarkson: An ongoing thing, every half hour, testing the density and testing the alkalinity coming out of that grinding circuit and weighing the feed. And we helped each other. At this point, that's where Hank [Henry] Bradley, Phil Bradley's brother, came in. He came in, not right at the beginning, probably a year later, after the startup. He became my partner. And then, when he left to go back to California, then I stepped up to his job as the float operator.

Swent: Oh, he was the flotation operator.

Clarkson: Yes. So in effect, he was my boss.

Swent: So why did you begin thinking about changing the reagent feeder, making a better one?

Clarkson: Well, that just came along with the problems, how to improve on it and be more accurate because you got pretty mad sometimes because things didn't work right, and so naturally, in my mind, there's got to be a better way of doing it. So that's where I got the experience that really led to the realization after I had gone to Grass Valley--there was problems there, too.

Swent: You didn't develop it when you were at Stibnite, then.

Clarkson: No. It was actually at Grass Valley that I put it into practice.

Swent: Right. I'm looking here at a letter from American Cyanamid that's dated November '35, and it's addressed to you in Grass Valley. By then you were working on this. But the idea, of course, grew out of your experience here.

Clarkson: The Stibnite experience was what--following Hal Lewers to Grass Valley. Because there were some reagent feeding problems there.

Life in a Tent House in "Hollywood"

- Swent: Let's not get you moved there quite yet. I'd like a little bit more about the situation at Stibnite. Where you were living at Meadow Creek?
- Clarkson: At what we called the sawmill camp. Also, it was dubbed as Hollywood. About four families lived there, right by the sawmill. To start out with, when they built the sawmill to saw the lumber for the mine and the new mill and so forth, there were several tent houses over there. My dad was working then as a millwright on the mill, and so I got two tent frames assigned to me, and my dad helped, too. We made a two-room cabin out of them. My dad had a cabin there also. They were all cabins.
- Swent: When you say "tent house," what do you mean?
- Clarkson: Well, I notice now around here they call them platform tents. The floor was put in with 1 by 12s; they were sided up three feet with 1 by 12s, 2 by 4s; and a 2 by 4 frame was built to put a 12 by 14-foot canvas tent over. So you had a board floor and four board walls, but the tent was the roof and the sides down--and, of course, you got the light inside. The light came through the canvas. We didn't have windows. But then--
- Swent: And the roof was just canvas also?
- Clarkson: Yes. It was just a 12 by 14 canvas tent with 3-foot sides that came down to the board siding that came up.
- Swent: Pretty cold in the winter.
- Clarkson: Well, amazing: Not so. Because little airtight stoves and excellent lodgepole wood. They were real warm. Through the first two winters, the construction people, all of the men--there was very few families--lived in these tents.
- Swent: You said "airtight stoves"?
- Clarkson: That's what they were called. Sometimes the stoves were made out of 50-gallon drums, but for a tent house, a smaller stove, so-called airtight stove. They could be filled up with wood at night, and then the wood would--shut up airtight. The wood would smolder all night and keep the tent warm. In the morning, open them up and add more wood. It required a certain amount of skill too--you couldn't come in just as a flatlander and know how to make everything like that work.

Swent: What did you do for toilet arrangements? Washing?

Clarkson: Outside with a bucket--a stand with a bucket and a washpan and towels. Then they built a bunkhouse for the regular crew, and the cook house. After it settled down to a regular operation, with the mine and mill operating on that basis, then some families, including ourselves, got established, and we made cabins out of what had been the tent houses. The single men, the men there without their families, had rooms, private rooms in the bunkhouse.

Swent: Did your wife go up with you at the first?

Clarkson: Yes.

Swent: Right away.

Clarkson: I got the cabin, fixed one room with a roof on it, before winter set in, so by the time I got up to the mill job, I had a cabin ready. We set up housekeeping. Of course, my dad and my stepmother, they were there a ways ahead of us. They were able to help out.

Swent: Was your first child born there?

Clarkson: Oh, no. No, our daughter was born in--we didn't have any children until we came to Grass Valley. Because at Stibnite we didn't have a doctor, although there was a couple of babies born there during that--a couple of the mine crew. But we were married six years before we had our first one. And Claudia was born in Grass Valley, and Curt was born in Greenville, in Plumas County.

Swent: Was this by intention that you waited until you could--

Clarkson: Yes, it was felt that it was--it worked out lucky! We didn't have our first--we got out where there was medical services.

Swent: What did you do for cooking and eating? Did Edna cook, or did you eat at the staff house?

Clarkson: Occasionally, on some special occasion, we were permitted to eat in the cook house. And after Lloyd White became manager, why, I was--he took an interest in my work and so forth, and so we became--he had his wife there, and they had two children, but their home was in Berkeley, and they had two kids they left them to go to school in Berkeley. But Mrs. White was a motherly type of woman. She took quite an interest in Edna, and so--they had a separate room in the cook house for the boss

to eat in. And every once in a while, they would invite Edna and me to eat with them.

Swent: Was Edna cooking on this airtight stove?

Clarkson: No, we had a little cook stove, too. Then, by that time, we had the second because there was two tents, end to end, so then one became the kitchen and the bedroom [chuckles], so--and, of course, my stepmother was an excellent cook, and she helped out a lot because their cabin was about a hundred feet from ours. Being at the sawmill site, the lumber was right there. The company gave us all the lumber that we wanted, but we had to do our own work. {I kept adding on.}

Swent: Is that what you burned in the stoves?

Clarkson: No. That first winter I didn't--almost all the others got up their winter supply of wood, but I didn't. Right behind our cabin was a real good stand of lodgepole, with seasoned dead trees standing. I would cut every day--why, every day I would get some ahead. I would cut wood up there and shoulder--I'd leave four or five or six blocks, all that I could carry, I would cut through, but not quite so they would separate, and I used my skis there. I'd go up and all that I could get on my shoulder, why, I'd ski down to the cabin with it and drop it off, and that's the way I got our wood all that first winter.

But the next winter I was prepared with a good supply of wood. In fact, I added a little woodshed for the next winter.

Swent: What did you do for light?

Clarkson: Lanterns, lamp, kerosene lamp. So-called Aladdin lamps were just coming into popularity then.

Our third winter, second summer, the company decided--this was after Mr. White came in as manager. He told us we could have electricity if we built the line from the mill over to our cabin, so along with the--had an electrician helping us. Then we got power to our cabin. But we could only use it for light because the power was all generated there on hydropower, so there was just barely enough to allow some more load, more lights being added.

Swent: It was a big help, though, I'm sure.

Clarkson: That helped a lot. And, of course, then we could have an electric radio.

Swent: Oh, yes.

Clarkson: That was the next step up.

Entertainment: Card Playing, No Drinking

Swent: What was Edna doing in the daytime?

Clarkson: Well, there was one young married couple there, and Edna had a brother that came in. I got him a job in the mill. He started out as a ball mill operator. And several young single fellows, including Hank Bradley, that stayed at the boarding house. We would play cards and have dinner parties. The mine foreman's daughter lived down just a ways from us. She was single, and so we were kind of the leaders of the young singles that would come to our house for entertainment and things like that.

Swent: What did you do for entertainment?

Clarkson: Played cards.

Swent: What?

Clarkson: Pinochle, pretty much. But then also started playing bridge.

Swent: Auction?

Clarkson: Auction bridge. {Cribbage was popular too.} Then that first winter we decided we needed a place for recreation, so the company let us take a lot of the reagents that were stored in the warehouse out, stored it in another--in a barn. Because they had livestock there, used horses then for hauling supplies around the camp. And also had a fellow, too, the fellow that ran the commissary, the store, was a young, single fellow, Frank Calender, from Cascade.

Swent: That was quite a lively crowd there, then.

Clarkson: And during the summer months we went fishing a lot and had fish fries and picnics, and during the summer months down to the Yellow Pine area to dances. To go down to Yellow Pine was twelve miles. But that wasn't a wintertime activity because the road was closed.

Swent: What about drinking?

Clarkson: That was a no-no in the camp. No liquor. Occasionally, some got in. There was a problem with one or two miners that drank vanilla and lemon extract [chuckles], swiped it out of the boarding house. But anyone that was caught drinking was promptly canned. So that didn't--nothing--no liquor, moonshine it was then.

Swent: This was Prohibition time.

Clarkson: Yes, so that was why there was moonshine. But that was a very hard rule, no liquor in the camp.

Swent: So at your dinner parties you had no liquor.

Clarkson: No, no, no. And the dances at that time. A little got sneaked in, but it was very, very, very well hidden because--and in those Depression years, why, a job--that really meant something because to get canned off from a job, that was a pretty hard blow.

Swent: Yes, it was, yes. What was Edna doing? Was she playing bridge with the other women during the day?

Clarkson: They were visiting. Two of them would do something together. A few families, including the fellow that was in charge of the power plants, the electrician, he lived--it was two and a half miles down to where they lived, so it was an hour or two trek to go visit some of the others and do things like that.

Swent: They would walk.

Clarkson: Yes, they had to walk. Sometimes we skied.

Swent: In the winter.

Clarkson: Because when I worked as a mucker in the tunnel job, I walked all the way from the sawmill camp down to the portal of the Monday tunnel, and I took it, and that was three shifts around the clock. I was away from the cabin about twelve hours, including the walking time. So it was lonely for Edna because no telephones or anything like that. We had a little dog, a little fox terrier, that kept her company. And then the neighbor ladies that we had. The singles, as I said, that were her age, they got around to do things. Made their own plans.

Swent: Did they read? Was there reading?

Clarkson: Oh, yes. Looking forward to the mail, either the dog team getting in with it or the airplane. And the paper. We got

magazines to read, like Collier's and the Saturday Evening Post and some Western stories. One of my favorites was True Detective, I think it was, which was a popular--and then we passed them on.

Swent: Did she do any handwork or crafts of any kind like that? Embroidery?

Clarkson: Some sewing, but she didn't have--I don't remember that any of them had a sewing machine, things like that, to keep occupied with. Of course, there was mending to do, work clothes, socks.

Water from the Water Hole

Swent: Well, I suppose that washing and cooking took up a lot of her time.

Clarkson: Oh, yes. Because I packed water. We all did. We had a common water hole that we all packed water from. During the summer--

Swent: A water hole?

Clarkson: Yes, by the creek. There was a place where--why we called it a water hole was because we used buckets and dipped the water up out of the water hole. It was a nice little stream, creek, that we had there. The main stream was Meadow Creek, and this was a tributary stream.

Swent: Did it freeze in the winter?

Clarkson: Oh, yes.

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Swent: So you were the one that got the water.

Clarkson: Before leaving, I'd make sure that Edna had two full buckets of water, and of course, that was our bathing, too. Then when she was washing, I would pack extra water. The first man in the morning out to the water hole by the creek, it was his job to chop the ice out. Lots of times that was my dad that got things ready.

Swent: Where did she wash? In a bucket?

Clarkson: Two washtubs in the kitchen. Had to do the washing in one and heated the water on the little stove in a wash boiler.

Swent: These were heavy khaki work clothes?

Clarkson: Well, my denim work clothes. In the wintertime we had longjohns, and they were wool, heavy wool, either grey or white, one piece.

Swent: Union suits.

Clarkson: Yes, that's right.

Swent: Isn't that what they were called?

Clarkson: That's what they were called. The miners most all wore grey ones because miners did a lot of their own washing, too. Flat irons to heat on the stove.

Swent: It's not easy.

Clarkson: No. We still have a couple--another time, when we have an interview, I'd like to take you over to our house because I have a lot of memorabilia.

Swent: I'd like to see those.

Clarkson: So we'll have one or two of the next sessions. Incidentally, too, we're going to have to skip the next one, on the 15th, because it's the only time that I can make a trip to Idaho that Curt can go check on our place up there and so forth, so we'll have to move that one ahead.

Swent: All right. I'll cancel my reservation, then. Well, it sounds as if you were both keeping very, very busy.

Clarkson: We both had good--everyone had to have good ability to cope.

Swent: My sense is that in these kinds of places, people have an awful lot of fun.

Clarkson: Well, we look back on the good times that we had. In the summertime, like the pictures in the Saturday Evening Post story, we went to the Cox ranch for dinner parties sometimes, and then dance way into the night. We'd go for a pack-out to some of the high lakes, the high mountains. Those were summertime things. And then we--then, in the later years, we had a better, much better recreation hall. In this period, the cook house was--they'd stack the tables up to the side, the

benches. And dance. Did have a piano and the other instruments.

Swent: You celebrated every birthday, I'm sure.

Clarkson: Yes, all of that. Anything for an excuse.

Swent: Excuse me. I interrupted you. The piano and what were the other instruments?

Clarkson: Violin, piano, and I think there was a snare drum and sometimes a saxophone and sometimes a banjo to make up the dance music. My dad played that type of violin. My dad was a fiddler, and he was quite an organizer. He could call the square dances and quadrille and the circle two-step.--{also he played a mouth harp.}

Swent: Well, it sounds like a good deal of fun.

Church. Was there any church that anybody went to?

Clarkson: Yes. That was held in the one--then, in this period, we had [a] one-room classroom in a long log building that was also [the] company office and a place for the teacher to live.

Howard and Lois Gillette Evans

Clarkson: In that period of time, I spoke of Edna's brother. His wife-to-be came in just the year before we left, the fall before we left in 1935. She came in as our one-room teacher.

Swent: That's Edna's brother's wife.

Clarkson: She was his wife-to-be. They were single, too, while we were still there. But the courtship started, and then the Christmas, just before Christmas the year that we left, 1935, they were married. And then Howard--

Swent: What were their names?

Clarkson: Howard Evans. That was Edna's maiden name. And the teacher was Lois Gillette, {fresh out of college--the University of Idaho at Moscow}.

Swent: Like the razor?

Clarkson: Like the razor name. Her family at that time was in Moscow. She graduated with teachers credentials from the University of Idaho. That was her first experience. She had been a farm kid down in the lower country. Her parents moved to Moscow and sent their three children to school there.

Then Edna's brother, Howard, in that period acquired a store job. First started with the job of running the Yellow Pine general store, post office and telephone, so after her school year finished, their new home was in Yellow Pine because they now had the store there, the general store.

Swent: You had a couple of promotions. You were a mucker, and then you were a ball mill operator, and then you were promoted up to flotation operator. What was your pay for these jobs?

Clarkson: I think early pay was \$4.50 a shift, seven days a week.

Swent: Eight-hour shift.

Clarkson: Yes, eight-hour shift.

Swent: \$4.50 a shift. That translates out to about fifty cents an hour, right? And Social Security had not come in yet.

Clarkson: We didn't talk about hourly pay.

Swent: No, it was the day.

Clarkson: It was so much an eight-hour shift.

Swent: And you worked seven days a week.

Clarkson: Yes.

Swent: Did you have any vacation?

Clarkson: Yes. Well, what we called the long weekend.

Swent: Oh, you rotated shifts.

Clarkson: We rotated shifts every two weeks, and then when we went from day shift to graveyard, when we changed to graveyard, that was called the long shift change, so it worked out to we had a full day off. And then the Fourth of July. The mill was shut down for repairs in the holiday season. And Thanksgiving. Always took advantage of the holiday period for the majority of field work, to do repairs and things like that.

Swent: You were given raises with these promotions.

Clarkson: I think I was up to about something like \$5.80 a shift, but everything then--you didn't spend any money, only to have an automobile. You didn't drive an automobile to work. It was just for special occasions or trips. And we didn't pay any rent. The only thing that was deducted from our check [was] if we had an account at the store. They took our store bill out of the paycheck.

Bradley Policy: Everything as Good as They Could Make It for Employees

Swent: And were things at the store reasonably priced?

Clarkson: Oh, yes. Because it was always held down to equivalent because the store was tied in with the boarding house because the store--all the boarding house supplies came through the store. The store was separately owned, starting at that point in time. But the fellow that ran the store was responsible for the meat and other things for the boarding house, so he had to make sure that the cooks at the boarding house had everything that they needed.

Swent: So it wasn't, strictly speaking, a company store?

Clarkson: No. It was in the beginning, but then in 1931 a businessman from Cascade needed a place for his son. He had a store in Cascade, too. So he bought the store business. But it was still, in effect, operated as a commissary. Clothes for the workmen and household items, as well as the normal groceries.

Swent: I guess what I'm hoping to get at is that--sometimes when you say "company store," there's this perception that companies were terribly exploiting their workers and running them into horrible debt. Was this situation different?

Clarkson: Yes. It was--of course, that was a Bradley policy that everything had to be good, as good as they could make it, for their employees.

Swent: So this was a help for the workers.

Clarkson: Yes. [chuckles] Someone--this was a joke. They said the company got a carload of Shredded Wheat biscuits. They came in big cartons about half the size of this desk. Kept in the

storage basement. It was a ground-level basement. They had all this huge stack of Shredded Wheat, so the company gave every family employee one of these cartons of Shredded Wheat, so we ate and ate on the Shredded Wheat all that one winter [chuckles]. Events like that. The company had livestock, cattle. The store fellow was also a butcher, and he had a helper, and he periodically butchered a beef for the boarding house, and then we would get some of the fresh meat from the store, too. But every employee had one of these little charge books, and the storekeeper would take the charge slip to the bookkeeper, to take it out of our paycheck.

Swent: But this was not a means of exploiting you.

Clarkson: No, no, no. It was somewhat though like the song, owing your soul to the company store.

Swent: Tennessee Ernie Ford, wasn't it?

Clarkson: Tennessee Ernie Ford's famous song.

Swent: But this was not that way?

Clarkson: No.

Swent: No. Well, I wanted to make that clear because I think it's important that it was not that way.

Clarkson: Those were hardy days.

Swent: Yes. You were advancing your education, I guess.

Clarkson: Well, it was an excellent place to advance education because the early work that I started out with in the Basin--the mills there were all--some stamp mills, some ball mills, but only gravity concentration tables and amalgamation. And by 1931, those were pioneering days for the flotation concept.

Swent: You were there at the right time.

Clarkson: At the right time, so I got experience and education all together that lots of others didn't get.

Swent: There are a couple of other questions I wanted to ask. One was--well, I guess we should get into the development of your reagent feeder, but one question is why you did it and not anybody else. And why someone else hadn't done it before you.

Other Reagent Feeders

Clarkson: Others had; there was the Ellis feeder, and there was a Kraut feeder, and there was a Geary feeder that Denver Equipment manufactured. And Western Machinery, Wemco, manufactured the Ellis feeder. They were all feeders for relatively large flows of liquid reagent. They didn't have the precision for the new reagents that were coming along with flotation development, that had the precision that they needed. And this meant dollars, because any time that the recovery could be stepped up 2 or 3 percent or 1 percent, say, starting out with 75 percent, it was usually considered a pretty poor recovery, then when you contributed to getting flotation recoveries up into the 90s, that meant a lot of dollars for the company and the economics of the overall operation.

Swent: The second question--and we'll talk a little more about this later--I wanted to know what sort of technological things made it possible now, where it wasn't possible before? Or what technological changes--the difference in reagents made it more important?

Clarkson: That all the time was making--like [American] Cyanamid would come in with a new reagent for a certain part of the recovery system, a multiplicity of reagents, and they needed to be fed in accurately and in small flows--so as quantities required went down, it also required more accuracy and dependability.

You might have heard the story, the old story that I got early in my experience, was how flotation was discovered in the first place.

Swent: Supposedly some woman washing her clothes, wasn't it?

Clarkson: Well, the wife of one of the miners was washing his diggers with muck all over them, why, the soap--that's what it was called for a long time, was soap flotation because caustic soda (lye) and grease--all a part of soap. The same formula applied to the early flotation because it took the alkalis, it took the grease, the oils, like fatty acid and cresylic acid was an acid-oil reagent and required precision feeding. But that's the first story that I heard.

Swent: In Colorado, I think, wasn't it? Supposedly.

Clarkson: I think some--maybe the Colorado School of Mines, the early metallurgy that was being done there. It had to be the lead-

zinc mines because that's what created the smudge on your work clothes. Another dirty one to work with was molybdenum, moly, up at Climax. Even the fellows there, if they worked in the bagging and shipping of the moly concentrate over there, it penetrated their skin, so they couldn't wash away the black lead-like color. {Observed among the flotation and filter section workers--especially the concentrate handlers.}

Then, too, flotation was called an art rather than a proven technology because each and every ore presented a different problem. Copper ores, the different copper ores, the different gold-bearing ores. And in this early period of the thirties, they developed in Cyanamid the means of floating the real fine gold into a concentrate in the Mother Lode country. Then they could cyanide the concentrate after it had been floated.

Becoming a Combination Mechanic and Metallurgist

Swent: So at this time, still, we're just getting ready to leave Stibnite, or to leave Meadow Creek. But you thought of yourself as a potential metallurgist? Or mechanical engineer?

Clarkson: Well, a combination, because I always was doing things mechanically--a metallurgist knew the chemical characteristics that they had to work with. But that also had to be provided with a sometime better mechanical means of accomplishing it, the flotation machines, even jigs and the various concentrators. Even in later years heavy media came in as a popular process.

Swent: Separation, is that?

Clarkson: Heavy media separation because in a heavy media they could lift the waste to the surface and skim it off, and then the heavy--it was a form of concentration. A lot of work was done on that at Bunker Hill, by one of my mill metallurgist consultants that was superintendent in Bunker Hill through the forties. I had charge of all the mill design at Stibnite and Bradley's Ima Mine, and even some of the mercury operations in California. So my part was always the mechanical part, to make a piece of equipment or something do the metallurgical job. So it was a combination of knowing the metallurgical characteristics, and how to best mechanically treat it.

Swent: At this point, were you doing any outside reading or studying?

Clarkson: All the time [chuckles]! Anything that was applicable.

Swent: Where did you get it? Where were you getting your information?

Clarkson: Well, from different ones that would tell me. {Professional papers, etc. Bulletins from American Cynamid Company, handbooks.} Of course, back then in the early forties--

Swent: We're still back in the thirties.

Clarkson: Well, I worked up to joining the AIME, but--

Swent: When did you join AIME?

Clarkson: In 1945.

Swent: Well, but back in the early thirties, you were still just learning. You educated yourself very well.

Clarkson: Yes [chuckles]. Exchanges. Other fellows that I worked with-- and metallurgists. They would come to see what I was doing, and that's the way we communicated a lot of things. Let's see....

Swent: Looking through a folder here now.

Clarkson: Some of these letters--some kind of a termite got into some of my files. I don't know whether you've ever seen--

[LONG PAUSE AS HE CONTINUES TO LOOK THROUGH FOLDER]

Swent: You're a very careful filer, I see. You keep good files.

Clarkson: I'm getting to where--I've prepared this, but--

Swent: I thank you for that.

Clarkson: This is how things--[information] was exchanged.

Swent: Oh, isn't this interesting!

Clarkson: Something got into the files and had to be--they worked between sheets and chewed up places in the paper.

Swent: For heaven's sake. The paper has holes eaten in it by an insect.

Clarkson: Some librarian, archivist, could probably tell me. But I was always, I guess, a good correspondent with people--corresponded

with people that I worked with, asking for solutions to problems.

Swent: This is typed. Did you type?

Clarkson: Yes.

Swent: Did you learn to typewrite somehow along the way?

Clarkson: Like this.

Swent: Hunt and peck, but still.

Clarkson: I always wrote my own reports and things like that.

Swent: Now, this is a letter about--

Clarkson: That's a fellow that worked for me at Buckhorn, Nevada.

Swent: He's writing from the Leroy Mines in Jackson, Amador County, California. This is 1939, and you're at Greenville, California, then.

Clarkson: Yes.

Swent: It's a discussion of whether or not a jig would--what is Edinger?

Clarkson: Edinger.

Swent: Edinger. Is that a kind of jig?

Clarkson: Ted Edinger was a mechanical engineer at Grass Valley. In this period of time, we set up a partnership because he was the manager at the time of the the Miners' Foundry Company in Nevada City and they got the job building and furnishing some of the equipment for the Indian Valley Mill. {Some of the last work for Miners' Foundry.}

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Swent: You personally set up a partnership {F.S.E.} with Ted Edinger.

Clarkson: Yes. To carry on. We retained our partnership. He carried on with a shop in Grass Valley until the outbreak of World War II, and then we dissolved our partnership in that.

Swent: You were able to do this even though you were employed by somebody else?

Clarkson: {I was still winding up the shutdown of the Indian Valley mill.} He was carrying on the work.

Swent: Well, this letter--parts of it are missing because of your animal friends.

Clarkson: Yes, the termites.

Swent: [reading] "Dear Bob, Otto Brown tells me that you are operating," I think, "a fine new plant with excellent results, and you are making use of an Edinger."

Clarkson: Jig.

Swent: Okay. "He suggested you might be willing to give me something about--" There are holes here, but anyway, he's writing for information about the jig and the grinding circuit. Okay, thank you.

Clarkson: This is from Edinger.

Swent: Here's a letter from Edinger. Now this is called the Miners' Foundry and Supply Company. Is that the partnership you had?

Clarkson: No, no. He was manager of this. Our partnership was separate from this, too, because he was an innovative mechanical engineer. He developed--his forte was welding. He made lots of advances in arc welding and flame cutting methods. He changed the--cut out much of the foundry work by going to fabrication designs.

Swent: So you're well on your way to becoming a mechanical engineer by now.

Clarkson: Yes [chuckles]. {I guess so!}

Swent: Okay. He's suggesting--"The listed capacity on the 6 x 5 ball mill is 105 tons per day." Then he does an analysis of the ball charges and so on, and he says, "It would be my estimate that the 7 x 5 mill on the finer feed, as outlined by you, might possibly obtain an ultimate capacity of 225 tons at our speed of 24-1/2 rpm as these tables are laid out for a speed of 22 rpm." So you're suggesting speeding up the tables and using finer feed?

Clarkson: Yes. Finer feed for flotation.

Swent: And faster, running it through faster.

Clarkson: We selected that size mill for the Indian Valley job. And then he said, "See how this line of reasoning checks out on your March tables. Sincerely yours, F. Edinger." You called him Ted, but his name was?

Clarkson: Frederick. Ted's the nickname. Like Bob for Robert.

Swent: Right, okay. Well, now, let's get back to Meadow Creek. How did you come to leave Meadow Creek, then? You were there for almost four years, or about four years, weren't you?

Clarkson: Almost five years.

A Memorable Vacation to the West Coast, 1934

Swent: How did you come to leave?

Clarkson: Our first big trip out of Idaho, we had a new Ford.

Swent: Oh! What kind of Ford?

Clarkson: Well, the first--our first one was a Model A, and then this was the first one with a V-8 engine, Model B, I guess it was. We got that by trading in our other.

Swent: How much did you pay for it?

Clarkson: Oh, I think that one we got up to something like \$700.

Swent: In 1934 that was a lot of money.

Clarkson: Yes. It was a lot of money. We saved for it, like we did for our first one because you just didn't buy a car without money to do it with. But we started out right. We always bought a new car, and we got a good trade for our other one. But when we got the new car, late in the summer of 1934, we decided then we could take a big trip, so we went ahead and asked Mr. White for a month of vacation in the fall of 1934.

Swent: Did Edna drive also?

Clarkson: Yes, oh, yes. She was a good driver. She was a good mountain driver. That's what's hard on us now is because Edna can't drive any more. I had asked for a month off, which Mr. White quite graciously gave me, said he thought I'd earned it. So we took Edna's dad. He was a widower. Her mother had died a few

years earlier. So we planned a trip through Salt Lake down through the parks in southern Utah, the Vermillion Cliffs, Marble Canyon, Moab, that area. Edna had family, a cousin in Phoenix and also her dad's sister lived there with her cousin, so this trip was planned. And then, from Phoenix to San Diego. We had friends who were former Boise Basin people, and her dad's, too. And then all the way--

Swent: That was quite a trip across the desert.

Clarkson: Across the desert was still sections of the plank road that we drove on.

Swent: Did you drive by night?

Clarkson: No, it was all daytime. All planned ahead of time.

Swent: How many days did it take you?

Clarkson: Well, we were a month.

Swent: I'm trying to think, from Phoenix to San Diego at that time.

Clarkson: I think we had one overnight stop at Needles or Yuma.

Swent: You made good time, then.

Clarkson: To San Diego. And after a great visit there, seeing the park and some swimming in the surf--

Swent: What park was that? Balboa?

Clarkson: Balboa Park.

Swent: That must have been great fun.

Clarkson: It sure was. And Edna also had some uncles in Los Angeles. They were in radio and entertainment. They were musicians, and we got--they had friends in San Francisco, and on up the coast to Portland and back to Stibnite. Of course, I had some information about it from Hal Lewers, who was then the Idaho-Maryland mill superintendent. That trip gave us itchy feet.

Swent: Did you get to Grass Valley to visit him?

Clarkson: No, but we got to meet a couple in San Francisco and the husband was working for him, so we had communication. But I didn't get to see Grass Valley then. But then we decided, well, maybe we'll put in another winter in Stibnite, which we

our plans, and I notified Mr. White that I was leaving, that I had the potential of a job in Grass Valley. When the roads were open come spring, we gathered up and disposed of what we wanted to and headed for California!

The Idaho-Maryland Mine, Grass Valley, CA, 1935

Swent: And when was this?

Clarkson: That was in June of 1935. With our worldly goods on our Ford. We went down through Oregon and visited some of the park areas in Oregon and on to Grass Valley and got ourselves settled there and lined up for a job. Well, actually, what Mr. Lewers started me doing--he was planning a pilot flotation plant, for a new cyanide process called sand-slime cyanide leaching.

Swent: This was at the Idaho-Maryland.

Clarkson: Yes. But he put me on driving an ore truck until that was ready. That was hauling ore between the different--they had four mills operating in that area, New Brunswick Mill and the Idaho-Maryland Mill, the old stamp mill, and the cyanide mill.

Swent: We didn't get the figures. How many tons per day were you processing at Meadow Creek?

Clarkson: That was 250 tons.

Swent: A day.

Clarkson: Building up from 100 tons up to about 250 tons a day.

Swent: And here at Idaho-Maryland, how many tons a day are you talking about?

Clarkson: The four mills--It must have been about 500 tons a day.

Swent: Not an awful lot different, then.

Clarkson: No. Most of the individual mills were down in the 100-ton to 200-ton range.

Swent: It wasn't drastically different, then.

Clarkson: All underground ore production. Even at Newmont's Empire mill, I think at their peak, they had eighty stamps dropping. I

think they figured five tons per stamp battery, five stamps in a battery--ten stamps in a battery, or twenty. A twenty-stamp mill would have two separate drives, so it would be ten stamps to a battery.

Swent: What kind of truck were you driving?

Clarkson: It was a big truck for the time, a Fageol ten-ton truck.

Swent: A what?

Clarkson: Fageol.

Swent: I don't know them.

Clarkson: They were one of the popular makes at the time--F-a-g-e-o-l.

Swent: Hmm. Okay. Ten-ton truck?

Clarkson: Ten-ton.

Swent: That's big.

Clarkson: Yes, it was big, that one. It was double axles, too. Two axles on the rear.

Swent: How much were you paid?

Clarkson: It was still in the \$5 to \$6 a day range. I think--when I left the Idaho-Maryland mill, it was up to nearly \$8.

Swent: Social Security came in about then.

Clarkson: Yes. Well, I signed up for Social Security when I got my Social Security number in Greenville. That was in the late thirties.

Swent: After this, okay. Taxes. Did you pay any taxes in Idaho?

Clarkson: Not in that period, no. Didn't pay any Idaho income tax until we went back to Idaho.

Swent: Were you paying federal income tax?

Clarkson: No, no. I don't--in the early thirties we didn't have any of that. The company paid taxes, but we didn't have income tax.

Swent: There was an income tax, but probably you weren't making enough.

Clarkson: Well, we were not making enough.

Swent: In California, then, your five-something an hour--you had to pay--were you paying for housing?

Clarkson: Yes. When we left Idaho, then we had to start--

Swent: Paying for housing.

Clarkson: Still walked to work, but sometimes drove the car. But we used to pool together. If we drove the car, there would be two or three.

Swent: Do you recall how much you paid for rent?

Clarkson: Oh, it was pretty--in today's--I think something like \$25 or \$30 a month.

Swent: What were you renting?

Clarkson: Our first place in Grass Valley was one of the old houses that had been made over for a duplex, and we had--there was an older couple had the apartment next to us, and the landlady lived in a new house, right next door to it. She was a task master, too. She set down all the rules [chuckles], very strict. And then, when Claudia came along, we rented another place.

Swent: In Grass Valley?

Clarkson: In Grass Valley. But between Grass Valley and Nevada City. It was a new place.

Swent: Was Claudia born in Grass Valley?

Clarkson: Yes, at the Landis Clinic. She was born in 1936, November of 1936.

Swent: At the Landis Clinic. And now you had all sorts of luxuries. You had indoor plumbing.

Clarkson: Yes.

Swent: Indoor bathroom. Running water.

Clarkson: Gas heat.

Swent: Gas heat. Electric light?

Clarkson: Well, the first one that was on Maryland Road was an old house, we had wood stove heat there. I had to get wood. Usually manzanita wood. But we had gas for cooking and hot water.

Swent: And electric lights.

Clarkson: And electric lights. But didn't have a washing machine yet.

Swent: No. Did you send your laundry out, or did Edna do it?

Clarkson: Some we sent. My work clothes we sent out, but Edna also did her own, like the baby clothes and things.

Night Shift in the Assay Office

Swent: So you were coming up in the world in a way.

Clarkson: Working the way up.

Swent: Were you still working shifts?

Clarkson: Yes. Well, from the pilot plant I went into the assay office. That was another apprenticeship, you might call it. When we finished the pilot plant job on the sand-slime separation, Mr. Lewers put me on the night shift in the assay office. I started that by bucking samples.

Swent: Bucking?

Clarkson: Yes, that's what they called it. That was picking up the samples from the mill and the mine, and then crushing and grinding them, getting them ready for assay. After a period of that, I had worked enough with the head assayer that I was given--they had two shifts in the assay office. I was given the night shift assay run, so that the assay returns would be ready for the mill superintendent and the mine foreman in the morning.

Swent: How did you grind them?

Clarkson: Pulverizer. We had so-called sample crushers. A jaw crusher and then a pulverizer to pulverize them. Then they had to be weighed out.

Swent: How big were they?

Clarkson: Samples came in a small sack, about five- to ten-pound sample, and it had to be crushed and prepared for assay. I was on that job as an assayer when I was offered the mill superintendent's job at Buckhorn.

Swent: How did you happen to be offered that?

Clarkson: That was one of the Cyanamid fellows, Otto Brown, was doing the metallurgical work. It was a relatively new mill that had been built by Western Machinery, WEMCO, and Otto Brown was out there, guiding the early startup, which didn't work right, and the first mill superintendent quit.

Swent: And Buckhorn was in Nevada, wasn't it?

Clarkson: Yes. Buckhorn, Nevada.

Swent: How far was this from Grass Valley?

Clarkson: Between Palisades and Eureka, because it was--and I went out there in mid-winter, one of the severest winters Nevada had. I went out in February. Claudia was just six weeks old when I was offered the job.

Swent: I'd like to get to say something about the role of these equipment sales people that came through. Was Otto Brown a salesman? A representative?

Clarkson: No, he was an American Cyanamid rep. He was a metallurgist. His work--Cyanamid did the test work on the Buckhorn ore and made recommendations for the mill design. They had done that back in Stamford, Connecticut.

Swent: How did he happen to know you?

Clarkson: Well, through the feeder. He was one of the early Cyanamid fellows when I developed the feeder.

Swent: Oh, but we haven't gotten that developed yet, so we've got to backtrack, then.

You got the idea for the feeder when you were working at Meadow Creek.

Clarkson: Yes.

Swent: And then you moved to Grass Valley, and at that point you began really developing the reagent feeder?

Clarkson: Yes, because, as I think I said earlier, a lot of the problems in gold flotation were just coming into widespread use with the new upturn of gold mines in 1935.

Swent: That's when the price--

Clarkson: \$35 an ounce.

Swent: --was set at \$35 an ounce.

Clarkson: So by that time I was pretty well known by Cyanamid and their metallurgists. Their big business then was flotation reagents.

Swent: And you had had contact with them at Meadow Creek?

Clarkson: No. Not much at that point. Not until after I moved to Grass Valley. Here we have a copy of Kelly Krebs' letter, where Lewers and Mr. Plate wrote letters to Cyanamid about the feeder. [see p. 115a]

Swent: I see. But by this time there was a feeder that you had developed.

Clarkson: Yes. And they were in use in Grass Valley and areas around there. I had sold about forty-five units to different mine operations around the area.

Designing the Splitter Receiver for the Reagent Feeder

Swent: Okay. Well, let's get back to how you made it first. You can't sell it till you make it [chuckles].

Clarkson: This might be interesting. The first prototype--there's a picture of it downstairs on the wall--was just a flat wheel. There was a little machine fabricating shop that a fellow had in Grass Valley, right near where we lived, and so I took my designs in there and had him cut out parts for me. I even used some automobile parts for the controls on it, some threaded parts from the brake system on a car.

Swent: How was this different from what you had been using before?

Clarkson: Well, the heart of it was the so-called splitter receiver. That was really the patentable feature. But the cup-wheel part, that had been--that was used in other feeders that were shop-built or developed--like the Geary feeder. But the Geary

feeder that was manufactured by Denver Equipment, it was like a Ferris wheel. The cups that dipped up the liquid reagent were on a pivot, so when the cup came up loaded or filled with reagent, it was passed over a bar that tipped the cup up and dumped it, quantity. And the control feature of it was to--the cup would either dump a little bit or dump its entire load. That was adjustable, to control how much each cup would dump. And then the number, the size, the number of cups on the wheel was also a factor in the design.

Swent: Was this the kind that you were using there at Grass Valley?

Clarkson: Yes. Well, it was in wide use. There was also an Idaho Bunker Hill feeder, but it was a common design built in their own shop.

Swent: This was the design you were working with.

Clarkson: It was a design that I was using.

Swent: Yes.

Clarkson: As an operator.

Swent: And you saw ways that you could improve it.

Clarkson: Improve it, yes. But the cups that I used were mounted rigid. Each cup poured its stream when it came up and came over the top and went down empty. The splitter receiver that I designed created an aperture between the receiver and the splitter. As each cup poured, a little slice would be taken out of the stream and flow out of the feeder. Well, it was all an open flow. There was no--well, maybe a bug, a miller or something got into it. But it proved to be a very accurate means of control. And then on the wheel, we could use different size large cups or small cups to change the range--stream size.

Swent: But they all emptied entirely.

Clarkson: Yes. And then in that early period we also developed a special float valve to keep the reservoir full all the time.

Swent: So you moved the adjustability from one part of the process to another. Was that it?

Clarkson: Yes, right. Always taking a little cut out of the flow, as it poured out from the stream.

Swent: That is the flow of the reagent.

Clarkson: Yes. Out into the system. Then another big advance right in the early 1936 was finding a source that we could build all the parts of stainless steel. That had never been done before.

Sheet Stainless Steel a Novelty

Swent: Why had it not been done before?

Clarkson: Stainless steel was just coming--sheet stainless steel and the metallurgy of it, drawing sheets, thin sheets, you might say, was just coming into use. Henry Ford was one of--the new Model A Fords--he used stainless steel for the radiator shell and also for the shell for headlights because the thin metal sheets could be drawn out into a specific shape. There was a company in southern California, in Glendale, that started. They started with Monel metal. Monel at that point was a popular metal for dairy vessels and cooking vessels and so forth. And stainless steel metals was the next development after Monel. They also developed a method, so-called deep drawing. They put these thin sheets and draw them into the shape of a bucket, a vessel--

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Swent: So this is the Metalite Company? In Glendale.

Clarkson: Yes. It was a small company, specializing in processing first --they were some of the earliest in bringing in the use of stainless steel.

Swent: How did you happen to hear of them?

Clarkson: Well, through Cyanamid because Cyanamid, the mechanical engineer with Cyanamid--his name was Joe Alcock--he was in charge of Cyanamid's mechanical--actually, manufacturing facility in Azusa, California. All these different fellows with Cyanamid, starting with Kelly [Krebs], communicated directly with me out on the job because I could give them other helpful feedback. Then they were starting to manufacture the Fagergren flotation machine, and I was working right along with flotation in that period. I was able to give them feedback on

improvements that could be made in the flotation machine design. And so I had established a good relationship and interchange with the different American Cyanamid men in different departments and different sales areas, but mainly with the flotation reagent sales people.

Swent: So you had this idea, improving on the--and you took it to your local shop man in Grass Valley.

Clarkson: Yes.

Swent: And he built one for you?

Clarkson: They were just fabricated from carbon steel--{he made certain parts}.

Swent: That's what it had been made of before, I see.

Clarkson: So that didn't take care of the problem with corrosion. Our next step was to--when Cyanamid first started manufacturing, it was all aluminum.

Swent: So how did you happen to get them to start manufacturing it?

Clarkson: That letter that I read.

Swent: Yes, but you said--

Clarkson: I let you have a copy of it.

Swent: Yes. You said you had already built over forty of these.

Clarkson: Well, that impressed Cyanamid.

Swent: How did you do that? You had them manufactured there in Grass Valley?

Clarkson: Yes. Well, I got the parts made and then put them together, and I sold them.

Swent: Were you doing this on your own time, at home?

Clarkson: Yes, it was home time.

Swent: But did you have a shop at your home?

Clarkson: No. Except just the tools to put them together after I had different parts made. And then, too, they were all belt-driven, and I had to devise a means to driving them from the

other equipment that was driving the flotation machine. They were so-called belt-driven then. And then Cyanamid--

Moonlighting at the Spring Hill Mill

- Swent: Before we get into Cyanamid, I want to--you first made one of these and tried it there at--
- Clarkson: At the {Spring Hill Mine Mill--a new mill by WEMCO. A multiple compartment Ellis feed was the only feeder on startup.}
- Swent: And it worked okay.
- Clarkson: Yes.
- Swent: So then what?
- Clarkson: Right neighboring to the Idaho-Maryland was the Spring Hill Mine. They had just built a new mill. The mill was built by Wemco, Western-Knapp, WKE.
- Swent: It later became Western-Knapp.
- Clarkson: That was one of their first complete mills--Buckhorn was next. They had been mostly a second-hand mill machinery dealer. They were starting to do a little manufacturing, but mostly remodeling existing mills with some second-hand equipment, and then putting it into a mill design. The Spring Hill mill, they built, and so I got--Don Carlos Billick at the mine had been told about my reagent feeder, so I built a reagent feeder for that job.
- Swent: They asked you to do this?
- Clarkson: Yes. I have some invoices on display down--. And then, by word of mouth, why, that spread out. Other little gold mills in the area. Even up at Downieville was a mill up there that I built some feeders for them and sold them--{all that were starting to use flotation}.
- Swent: You say you built them. Exactly--what were you doing? Who was making the parts?
- Clarkson: This little shop in Hills Flat. Hills Flat was a little suburb of Grass Valley, a shop area. I don't even remember the man's name, but I would take him my drawings and show him what I

wanted him to make and fabricate the tank and make some of the other parts, and when he'd get that done, then I would take the parts and put them together.

Swent: And you were using the Idaho-Maryland shop to do this?

Clarkson: No. Everything stayed away from that point on because Mr. Lewers, Hal Lewers, said that he thought it would be wise if I didn't get involved in anything at the Idaho-Maryland, that I keep it entirely away from there.

Swent: He didn't object to your doing this.

Clarkson: No. He was helping, giving me help. Suggestions and so forth. He was--like that letter, he was helping.

Swent: This is what I want to clarify, that you were an employee of Idaho-Maryland but this was your own activity that you were doing.

Clarkson: Yes. On his advice, I kept it away from there.

Working in the Woodshed

Swent: Where were you doing it?

Clarkson: In the woodshed [chuckles]. With the house, the duplex, we were renting, we had a woodshed because our heat was wood.

Swent: You were doing this evenings and weekends?

Clarkson: Whenever I had the time after my work shift. But I was also moonlighting otherwise--this is another story--at the Spring Hill. When they started up the mill, Mr. Plate, the manager--they just started one shift and then two shifts, and while I was working at the Idaho-Maryland, I would go over after my day shift and [work] the second shift at the Spring Hill [chuckles]. That was within walking distance. So I had a period of--and I developed some other little devices to help out in the new mill at the Spring Hill. And at that time also got acquainted with Frank McQuiston. And Frank McQuiston used some of the first Cyanamid-built feeders over at Newmont, at the North Star; most of the flotation work then was at the North Star. That's where he used some of the very first feeders that were built by American Cyanamid.

Swent: How did you decide how much to charge for these?

Clarkson: Thirty-five dollars. They were just built--I'll show you when we get on--I'll show you--the cost of parts plus some for me.

Swent: How did you arrive at that figure?

Clarkson: The parts that I paid the shop man for making for me. And some of the adjustment parts I picked up at an automobile junkyard. The little levers and threaded stem that I used an automobile part for. The cups were fabricated at the shop, and I figured my time.

Swent: So your first one was \$35. I'd like to give Edna a little credit. She must have encouraged you, too. You were spending a lot of time with that.

Clarkson: Yes, she was the homemaker and put up with my time being occupied with other things.

Swent: You were pretty busy. So by November '35, Mr. Plate and Mr. Lewers--Mr. Plate was the Spring Hill manager and Mr. Lewers was the--

Clarkson: Mill superintendent.

Swent: Idaho-Maryland mill superintendent. And they wrote about the reagent feeder. You sent Cyanamid a model.

Clarkson: Yes.

Swent: An actual feeder?

Clarkson: Well, yes. It was a working model. It was just like the ones I was selling around the area.

Swent: A demo. What did you write to them? Inquiring about getting a patent for it? Was that your question?

Clarkson: Well, there was correspondence about getting the patent.

Swent: This is in response to a letter from you, and it just says, "Thank you for your letter on the model." But it doesn't say what your letter asked. What did you ask them?

Clarkson: Well, I just--see, I had already discussed it with Kelly Krebs and another fellow that was working--another Cyanamid fellow that was working the Grass Valley area. And then they saw--both of them saw some out in mills that they--mines that they

AMERICAN CYANAMID & CHEMICAL CORPORATION

AZUSA, CALIF.

TEL. AZUSA 39411



November 15, 1935

Mr. J. R. Clarkson,
Box 10, Maryland Road,
Grass Valley, California

Dear Mr. Clarkson:

Thank you very much for your letter and the interesting model of the reagent feeder just received. Mr. Plate and Mr. Lewers have also written me on the subject.

I have written to Hal and told him that we should like to know from you just what features may be patentable as it makes it rather difficult for me to present the matter to New York in a business-like manner without the mechanism being patentable or without your taking steps to acquire a patent.

Should you desire, Cyanamid may be willing to make a patent application, but other details will depend upon our findings as to its patentability and its value.

I believe it would be a good idea if we were to make a few feeders and put them in use that the field men from this office may have an opportunity to observe their efficiency and would like to have your comments to know if this meets with your approval.

Very truly yours,

AMERICAN CYANAMID & CHEMICAL CORPORATION

Kelly Krebs
K. Krebs
Metallurgical Chemicals Division

KK:MH
cc NY

were calling on, and so they heard about it in different ways. So then there was a lot of correspondence in my file. The procedure of getting it started and setting up the licensing.

Getting an Agreement with American Cyanamid, 1936

Swent: You wanted Cyanamid to get the patent.

Clarkson: Yes.

Swent: They did the patent.

Clarkson: Yes, but--they started--a patent was never granted on it because they didn't carry--they designed them but they didn't carry though on that. So we just went ahead without a patent. The steel, the stainless steel--we decided that that was the best patent that we could have because no one could duplicate the stainless steel parts at the price we were doing it. Decided--a lot of exchange went on. We finally just went ahead without formalizing the patent on it. So it really never had a patent issued.

Swent: So there wasn't anything to prevent someone else from copying.

Clarkson: Except it was not a high-volume item. I know there were some that tried. Denver Equipment tried, and they found that they couldn't duplicate the quality of the stainless steel work without putting an awful lot of money into it, and so we weighed those possibilities, and the judgment proved to be okay on it.

Swent: What were you asking from Cyanamid? What did they do for you?

Clarkson: Well, of course, they paid a royalty on every feeder.

Swent: They marketed them, in other words.

Clarkson: Oh, yes. They marketed them through all of their outlets all around the world.

Swent: And did they take over the manufacturing as well?

Clarkson: Yes, they did the manufacturing. They took--as I stated, they started with just fabricated and cast parts. Then we went to aluminum. I was giving them, telling them--they would come to me with suggestions, how to make a certain part of a certain

material. We went through aluminum, and then this opportunity came up with stainless steel, and we went through that. From then on, it's virtually the same design from 1936 to the present day.

Swent: Really.

Clarkson: But the volume--as compared to the valves, the volume was never great enough to invite a competitor.

Swent: Still, you had to sign some sort of--make some sort of agreement with American Cyanamid.

Clarkson: Yes.

Swent: When was that?

Clarkson: That was in 1936. Well, actually, a letter of agreement in 1935 and then formal agreement on the royalty being paid, their doing all of the manufacturing and all of the marketing. Of course, I had quite a bit to do with the marketing because the generic name at that point had a whole lot to do with it, too.

Swent: But by then, you said, you had already sold over forty?

Clarkson: Yes.

Swent: That's a lot.

Clarkson: There was lots of little operations in California and Nevada in that period of time.

Swent: Did you just make them up to order?

Clarkson: Yes, I made them up to order. I'd get an order for one or two or three, and I'd get right busy on it. But I never--I always held down a job. I never stopped working on a job to work with the feeder. I didn't do that until Cyanamid decided to quit manufacturing. They sold the Fagergren float cell to Western Machinery, Wemco, and the feeder. But Wemco thought that the feeder was coming along with the float sales, and I changed that, along with Kelly Krebs, because Kelly Krebs was looking for a job then.

Swent: I see. So that's what precipitated your forming your own company.

Clarkson: Yes.

Swent: But that was--

Clarkson: 1950.

Swent: Well, we had better wait till we get up to that. One of the things that I'm interested in bringing out is the importance of what we used to call drill peddlers or the equipment salesmen, these roving people that went to all the mining places from the various companies. I think they were very important people, weren't they?

Clarkson: Yes, like Otto Brown. He was a choice friend. But his entire career was with American Cyanamid on metallurgical test work, and then applying, selling the reagents, and also flotation machines, and for that period of years, the Clarkson feeder. Selling the flotation machines and the feeder went right along with selling the reagents. That was really the--selling flotation machines was a feast or a famine. In our business, we call that contract work. But our base work is ones and twosies, supplying one and then supplying the parts and so forth. What Cyanamid was doing--their base business was the chemical business, selling reagents and manufacturing them.

Swent: What term did you use in referring to his job? What did you call him? They now call them manufacturers' reps, but I don't think they called them that in those days.

Clarkson: No, they were not reps. They were all hired representatives of American Cyanamid. Basically consulting metallurgists.

Otto Brown, a Mill Man's Mill Man

Swent: How did you refer to his job? What did you call it?

Clarkson: Well, he was always referred to as a metallurgist. Kelly Krebs and Otto Brown and others. Cyanamid. Because they were involved in the test work to begin work. Of course, that was an engineering function because when a company was designing a new mill, building a new mill or remodeling, they would have Cyanamid do the test work on their ore, and then Cyanamid would make the recommendation for the flotation machines and the reagents required with it. They were--field representatives was probably the full term, not a manufacturer's rep. Because they were not representa--Like our reps. They represent other products that are compatible with ours.

Swent: I was just wondering if you had some sort of slang term for them. I used the word drill peddler, for instance. I remember we used to hear that term. But that was for the equipment salesmen.

Clarkson: A term especially applied to Otto Brown was that he was a mill man's mill man because he just--the operating crew just loved to have Otto Brown come out. He would give them some new pointers on how to solve a problem and how to do things, and they in turn would buy their reagents from him.

Swent: They really were educators, weren't they?

Clarkson: Yes. Because they visited all the mills. One mill had developed a good system and improvement, why, they'd pass on word to the next one, so an awful lot of information traveled by word of mouth. And the bad news sometimes, too.

Swent: And also information about jobs.

Clarkson: Yes. My job--I said that I was never long out of a job. When one was winding up or something, like, different friends would line me up on what was out there that I might be interested in. I might be able to get an example [going through correspondence file].

Swent: We talk so much now about networking. They were the people that did a lot of that, weren't they?

Clarkson: Yes. I don't like to stop and take time to hunt for something.

Swent: Oh, that's okay. I'm so pleased that you have all these files.

Clarkson: Each time that I shuffle through them, then I seem to mix them up again. Here is one of those little bugs that chews things up.

Swent: You've done a nice job of mending them, though. Could we have a copy of this letter?

Clarkson: I can get one made.

Swent: That would be nice to have one. It's a letter about a job, which I take it you didn't take. What is I.V. Equipment?

Clarkson: Fabrication service.

Swent: No, I.V.

FABRICATION SERVICE ENGINEERING

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May 16, 1941

Mr. J. R. Clarkson
O'Neals, Madera County
California

Dear Bob:

I tried to locate you in San Francisco Tuesday but learned later from Jack Ehrhorn that you had left for Fresno.

I had with me a Mr. C. W. Anderson, Public Service Building, Portland, who is consultant for the H & H Mines and is in need of a competent Mill Super on two different properties near Eugene, Oregon.

Thought you might like this part of the country better and could drop him a line at my request. It's a differential float proposition lead-zinc and copper-zinc and I understand they are having trouble at one of their plants.

He may put the I. V. equipment in at Cottage Grove.

Yours,

Ted
Ted

VLM

Lbs/min. Tons/hr. Tons/day

100	-----	3.00	-----	72.0
1	-----	3.03	-----	72.7
2	-----	3.06	-----	73.4
3	-----	3.09	-----	74.1
4	-----	3.12	-----	74.8
	-----	3.15	-----	75.6
	-----	3.18	-----	76.3
	-----	3.21	-----	77.0
8	-----	3.24	-----	77.7
9	-----	3.27	-----	78.4

110	-----	3.30	-----	79.2
11	-----	3.33	-----	79.9
12	-----	3.36	-----	80.6
13	-----	3.39	-----	81.3
14	-----	3.42	-----	82.0
15	-----	3.45	-----	82.8
16	-----	3.48	-----	83.5
17	-----	3.51	-----	84.2
18	-----	3.54	-----	84.9
19	-----	3.57	-----	85.6

120	-----	3.60	-----	86.4
1	-----	3.63	-----	87.1
2	-----	3.66	-----	87.8
3	-----	3.69	-----	88.5
4	-----	3.72	-----	89.2
5	-----	3.75	-----	90.0
6	-----	3.78	-----	90.7
7	-----	3.81	-----	91.4
8	-----	3.84	-----	92.1
9	-----	3.87	-----	92.8

130	-----	3.90	-----	93.6
1	-----	3.93	-----	94.3
2	-----	3.96	-----	95.0
3	-----	3.99	-----	95.7
4	-----	4.02	-----	96.4
5	-----	4.05	-----	97.2
6	-----	4.08	-----	97.9
7	-----	4.11	-----	98.6
8	-----	4.14	-----	99.3
9	-----	4.17	-----	100.0

140	-----	4.20	-----	100.8
1	-----	4.23	-----	101.5
2	-----	4.26	-----	102.2
3	-----	4.29	-----	102.9
4	-----	4.32	-----	103.6
5	-----	4.35	-----	104.4
	-----	4.38	-----	105.1
7	-----	4.41	-----	105.8
	-----	4.44	-----	106.5
9	-----	4.47	-----	107.2

Lbs/min. Tons/hr. Tons/day

150	-----	4.50	-----	108.0
1	-----	4.53	-----	108.7
2	-----	4.56	-----	109.4
3	-----	4.59	-----	110.1
4	-----	4.62	-----	110.8
5	-----	4.65	-----	111.6
6	-----	4.68	-----	112.3
7	-----	4.71	-----	113.0
8	-----	4.74	-----	113.7
9	-----	4.77	-----	114.4

160	-----	4.80	-----	115.2
1	-----	4.83	-----	115.9
2	-----	4.86	-----	116.6
3	-----	4.89	-----	117.3
4	-----	4.92	-----	118.0
5	-----	4.95	-----	118.8
6	-----	4.98	-----	119.5
7	-----	5.01	-----	120.2
8	-----	5.04	-----	120.9
9	-----	5.07	-----	121.6

170	-----	5.10	-----	122.4
1	-----	5.13	-----	123.1
2	-----	5.16	-----	123.8
3	-----	5.19	-----	124.5
4	-----	5.22	-----	125.2
5	-----	5.25	-----	126.0
6	-----	5.28	-----	126.7
7	-----	5.31	-----	127.4
8	-----	5.34	-----	128.1
9	-----	5.37	-----	128.8

180	-----	5.40	-----	129.6
1	-----	5.43	-----	130.3
2	-----	5.46	-----	131.0
3	-----	5.49	-----	131.7
4	-----	5.52	-----	132.4
5	-----	5.55	-----	133.2
6	-----	5.58	-----	133.9
7	-----	5.61	-----	134.6
8	-----	5.64	-----	135.3
9	-----	5.67	-----	136.0

190	-----	5.70	-----	136.8
1	-----	5.73	-----	137.5
2	-----	5.76	-----	138.2
3	-----	5.79	-----	138.9
4	-----	5.82	-----	139.6
5	-----	5.85	-----	140.4
6	-----	5.88	-----	141.1
7	-----	5.91	-----	141.8
8	-----	5.94	-----	142.5
9	-----	5.97	-----	143.2

200	-----	6.00	-----	144.0
-----	-------	------	-------	-------

Clarkson: Indian Valley.

Swent: Oh, Indian Valley! I knew it wasn't intravenous. Okay. Well, that's a very nice example of the kind of thing that happened. I would like a copy of this.

Clarkson: There's another one that would go nicely with that, if I can--

Swent: All right.

Clarkson: I used to type up my own reports and things like that.

Swent: Oh, my.

Clarkson: And always communicated with friends in the business about jobs.

Swent: That's terrific. Computers have made that all so much easier now, of course.

Clarkson: They caused me to get obsolete. I'm obsolete when it comes to the computer.

Swent: We could include one of those reports. Let's have one of those reports that you hand-typed. I think that's pretty impressive.

Clarkson: It might be a--

Swent: Gives a real sense of how painstaking work was in those days.

Clarkson: That's not a very good copy.

Swent: Well, but we can use that. So you did a report like this every what? Every month?

Clarkson: Yes.

Swent: Every day?

Clarkson: Well, sometimes there were daily reports, sometimes a week, or whatever.

Swent: There's no--

Clarkson: There's a different kind. Getting quite a way--this gets down to the Grand Reef.

Swent: We haven't gotten there yet.

Clarkson: Just an example.

Swent: Well, you know, this may be a good place for us just to take our break. Shall we, Bob? It's almost two o'clock. Let's do that.

[tape interruption]

Mill Superintendent at Buckhorn, Nevada; Very Difficult Ore

Swent: We're continuing now after our lunch break. You were just to the point of leaving Grass Valley to go over to Buckhorn, which is in Nevada. How did that come about?

Clarkson: That was by Otto Brown. Otto Brown had supervised the metallurgical test work for the design of that mill, and then, after the mill was built and they started it up, I guess, sometime in late 1935 or '36, they had him out there on the hotseat, trying to get the metallurgy to--

Swent: Who was building it? Who owned this mine?

Clarkson: It was known as the Pardners Corporation, a New York company. The president of it was Baragwanath. Pardners. Spelled with a "d." Pardners Corporation. Baragwanath was the president of the company. I have to think of his first name. And then Philip Wilson, also a well-known mining man. They were both New Yorkers.

##

Clarkson: The Buckhorn Mine was a George Wingfield property.

Swent: An historic old Nevada name. It was an old mine, then, that they were remining?

Clarkson: Yes. Very difficult ore.

Swent: What was it, gold?

Clarkson: It was gold. It was a clay ore. It was both hard to mine and very difficult to mill.

Swent: This must have been quite a challenge.

Clarkson: It was a clay-like ore with shattered sulfides through it. Some of it was pretty high-grade ore, assays up to three ounces in some of it. But we didn't have mill heads like that. The ore was clay gangue, shattered chert and sulfides--arseno pyrite. And very acid. The clay fraction was very acid from the arseno pyrite.

Swent: Otto Brown was working there as a consultant then?

Clarkson: No, American Cyanamid set up the metallurgical plan (flow sheet) of the mill, but because of the acidity of the ore, they were not having any success, so he was out there as an American Cyanamid metallurgist because they sold the flotation machines and the reagents and the feeders.

Swent: How did you get into the picture?

Clarkson: The mill superintendent quit who was there, and they needed a new mill superintendent, so Otto Brown recommended that they try to get me, and that's the way it happened.

Swent: How did you get the offer? By mail? By phone?

Clarkson: By telegram.

Swent: That's another thing that has changed. Have you had a telegram recently?

Clarkson: [chuckles] That seems to be something of the past.

Swent: Yes, it is.

Clarkson: The telegram was sent to Hal Lewers, the mill superintendent, because he was also an acquaintance of Otto Brown. And then Hal Lewers delivered the telegram to me. And then he told me-- he had worked there in early days, though, because it was a cyanide--they tried cyaniding the ore, and it was a failure because of the clay, so he told me what he knew about it. He said, "That's a good offer. You might as well take it." He said, "If it doesn't work out, you can always come back here."

Swent: How nice!

Clarkson: So that was nice of him. The next telegram, I accepted the job. Otto had gotten out there before the big snow storm. He had been there several weeks, trying to make a go of it, and then, by the time I got there, it was all shut down because it was mid-winter, and they were having all kinds of problems.

And then I spoke of Carlos Van Law. He came in as the new manager; when he took the job, he felt he was just taking it as a consultant, but then after he got there, they prevailed on him to stay and run the job. That was an interesting time.

Swent: So you were mill superintendent now.

Clarkson: Yes. And a friend that's still living here in Reno, Bob Spitzer, was the mine superintendent. That's when I first got acquainted with him.

Swent: How much did they offer you to go there?

Clarkson: That was \$250 a month and all my expenses.

Swent: They provided housing?

Clarkson: Yes, housing. Tent house.

Swent: Tent house again.

Clarkson: But that couldn't happen until summertime because it was just too cold, so they had a staff house and the boarding house there.

Swent: Did Edna stay in Grass Valley then?

Clarkson: No, she went to Spokane to stay with her sister. She didn't want to stay down there alone. It would have been hard for her with the baby.

Swent: The baby was very small, you said.

Clarkson: Yes. She was six months old when I got that job.

Swent: Really young.

Clarkson: So we got all of our belongings taken care of there, and I shipped her and the baby up to Spokane on the train, and when I got all that done, I headed for Buckhorn, drove to Carlin, Nevada, and stored my car.

Swent: And Buckhorn was not operating at the moment.

Clarkson: No. Well, they were maintaining the mine, but they couldn't take any ore out because the mill was not running and so it was just--when we got the mill running--when I got the mill ready to run and running, we called it the Buckhorn Jinx, so we

buried the jinx and all of the broken parts. There's a story on that.

Burying the Buckhorn Jinx, 1937

Swent: What size was the mill?

Clarkson: Oh, in the 100-ton range.

Swent: So you were now--this was your first experience, I guess, managing, wasn't it?

Clarkson: Yes, it was.

Swent: You had to hire the people.

[going through papers]

Swent: The Buckhorn Jinx, okay. Here's an article from the Reno Gazette Journal, December 10, 1978. "Star-Crossed Ghost Town of Buckhorn." [appendix p. 342-343]

Clarkson: The pictures were not with that article. I had the pictures of hanging and burying the jinx.

Swent: So this was your idea?

Clarkson: Yes.

Swent: "Bob Clarkson and his Mill Crew Slayed the Jinx," I guess. "The Jinx Burial Procession." "Funeral and Burial Rites for the Buckhorn Jinx." That's cute. You had an effigy and dragged it down the street, put it in a casket, and killed the jinx. That's very cute. Can we have a copy of that, too?

Well, we do have lots of fun in these places.

Clarkson: I'm glad that I kept the memorabilia.

Swent: I am, too.

Clarkson: Because memory fades, you know. So much could be lost.

[tape interruption]

Clarkson: It's not as well organized as I would like to have it.

Swent: Well, I think you're remarkable. So you got over there. Was there a crew? Did you have to build up the crew?

Clarkson: They were trying real hard to hold a full crew together, but I had to replace some because some left when the former mill superintendent left.

Swent: It was closed down because of the storm; is that right?

Clarkson: That was part of it. But all the trouble they were having in the mill. The mill was actually falling apart. I mentioned about the acidity of the ore. All the steel construction in it, the pump lines and everything. It was just amazing how destructive it was, and there was so much--

Swent: This was a new mill?

Clarkson: A newly-built mill and it had only operated for a few months.

Swent: And it was already falling apart?

Clarkson: It was already falling apart.

Swent: Oh, my!

Clarkson: They needed more capacity in the flotation section and also the gravity, so in the course of getting rid of all the things that were eaten up by the acid, using methods of prevention and all of that, then we expanded the concentrator section. So it took from February to when spring started coming--the snow was gone --that we were able to start it up again and run full time.

Swent: Now, let's see. You buried the jinx in--

Clarkson: Does that show a date there?

Swent: Well, the date of this publication is 1978.

Clarkson: That was taken--

Swent: When was it that you buried the jinx?

Clarkson: I think it was late in April or mid-April.

Swent: Oh, 1937.

Clarkson: Yes.

Swent: Right, okay.

Clarkson: But we couldn't start up until we had--the road was opened down to the narrow-gauge railroad and all of that, so there was a long period there of practically rebuilding the mill. Had a good crew and I brought in two or three fellows when we were ready to start up, so I had a full mill crew again.

Swent: So basically were you changing the processing?

Clarkson: Not really. Just making the equipment adequate for it. We did make some changes in the flow sheet. I have diagrams of the flow sheet and all of that. And then we added some new equipment, some pumping equipment. And the equipment that had unprotected exposures to the acid pulp, we did things to prolong the life of the equipment and so forth. And then Otto Brown made some recommended changes in the treatment of the ore, the flotation reagents and so forth. When I got there, why, he briefed me on everything as much as he could and gave me his reports, and then he very happily took off. He was very glad to get out of that place.

Dresser Couplings and a Standby Line Solve Some Problems

Swent: I'm sure. Were you again switching over to stainless steel, perhaps?

Clarkson: No, no. That wasn't possible. I had the feeders there, and they were stainless steel, but for the most part it was using coatings. We couldn't do anything about the pump lines, for example, where the pulp was flowing. We couldn't line that and we didn't have plastic pipe then. But they were using threaded pipe and the so-called Dresser coupling. You could put pipe together without threading it, so that increased the life of the pipe because threads always cut away almost a third of the pipe wall, and that's where the breakdown would come.

And then the other thing I did was to put in standby pipelines, so when one was about to go, we had a standby in there ready to use.

Swent: Dresser couplings, you said.

Clarkson: Yes. They replaced threaded pipe couplings.

Swent: And that was something new then.

Clarkson: Oh, they were relatively new then. They were just coming into wide use.

Swent: Is this a capital "D"? Dresser Industries.

Clarkson: Dresser Industries.

Swent: Okay. And standby pipe.

Clarkson: And concentrating tables. They didn't have any concentrating tables. That was a second chance to recover some of the sulfides that we couldn't and didn't get in the flotation section. It was a self-grinding ore because of the clay ore, the masses of sulfide in it. It was just clean free sulfide without any hard rock, and then pieces of shattered chert through the ore. They were small chunks, and they were more of that in the beginning, so instead of a ball mill or a rod mill, they put in a tube mill. That was a longer mill. I think it was about twenty feet long by five feet in diameter. And the chert, the hard chert in the ore, served as the grinding medium. {Of interest too, the mined ore was fed directly from the ore bin to the mill--no crushing.}

An addition, too, was to put a trommel screen on the end of the ball mill. When the ore pulp discharged, why, it screened out the excess chert so it didn't go into the classifier. We could even shovel some of it--if we needed more grinding medium at times, we could shovel some of it back. But it came out just like--after going through the mill, they were very much like the chert pebbles that were imported from Norway in earlier days for pebble mills.

In the early days of mining, when pebble mills came in to doing the fine grinding after stamp mills, they shipped back chert pebbles from Norway as ship ballast--got it back over here pretty cheap because they could be well used. They had laden ships going to Europe and could ship the pebbles back as ballast in the hold.

Swent: So you were producing your own chert pebbles.

Clarkson: Right. The last time I was out there, I looked to see if the pile of pebbles that had accumulated was still there, but I couldn't find them. That job wound up making a little money for the company in working out all of the sulfide ore. The later mining operation, then they developed a way of cyaniding the remaining oxide ore and made another successful operation out of it. But that was all an open pit. The original mine there was a glory hole operation.

Swent: When you were there it was?

Clarkson: Underground. When we left there and came back to Grass Valley, that's when Ted Edinger and I really started working together.

Back to Grass Valley and Work with Ted Edinger, 1938

Swent: When was that?

Clarkson: That was starting in 1938.

Swent: You were not at Buckhorn very long.

Clarkson: No.

Swent: About a year?

Clarkson: It was just about a year.

Swent: And then?

Clarkson: We could have operated a little longer, but we made the decision with the company officials because of winter coming on, to let the employees get out and get re-established before hard winter set in. The Getchell Mine was then starting up, and some of the employees got the opportunity to go to Getchell. I didn't. I elected to go back to Grass Valley and work some with Ted Edinger.

Swent: You worked for him, then?

Clarkson: Well, it was for and with him. {He was then still heading up Miners' Foundry.}

Swent: You didn't go back to Idaho-Maryland.

Clarkson: No, no, no. Idaho-Maryland. There was a better opportunity to go out on my own because he had nice jobs lined up--{a new role for the declining foundry business}.

Swent: What kind of jobs were they?

Clarkson: Mill remodeling, mill design, construction, things like that.

Swent: Okay. This is FSE. And were you a partner?

Clarkson: I was a partner--{after the Indian Valley job at Greenville}.

Swent: You invested in the business?

Clarkson: Eventually I became a partner. He completely left the foundry, and then we were partners together. But we still utilized facilities at the foundry in Nevada City.

Swent: What sort of arrangement did you have when you went with him?

Clarkson: Just a partnership.

Swent: Did you invest in it? Or did he pay you?

Clarkson: No. We invested some. We didn't need to invest much. We would take a job and we would get an advance on the job. About all we needed was employees and rolling equipment and the foundry. The foundry was supplying the equipment that we needed. Whatever: ball mill, crusher. {Mostly used equipment. The foundry was still manufacturing mine cars and gravel washing units.}

After I came back from Buckhorn, my first job was to remodel a mill at Sierra City. It was an old stamp mill. We added a small ball mill and flotation machines. I was there for a few months, finishing that job, and then our next job was the Indian Valley mill. I stayed on there as mill superintendent.

Swent: Did Edna go with you each time?

Clarkson: Oh, yes, yes. We found a nice house to live in at Sierra City. It was started in the wintertime. I commuted back and forth to Grass Valley, and they lived there for a while during the winter.

Swent: I'm just trying to get a sense. This is 1938, so we're kind of coming out of the Depression now. Was the war on the horizon already?

Clarkson: Well, there were storm clouds, war clouds.

Swent: How were you aware of that?

Clarkson: By things that were happening. The government was starting to establish strategic minerals. They were building a magnesium plant, started to build a war plant, magnesium plant in Henderson, Nevada, and some fellows that I knew went to that job. {Titanium at Henderson after the war--1950s.}

Swent: Titanium or magnesium?

Clarkson: Magnesium. It became titanium in late years, but it was magnesium.

Swent: Basic magnesium.

Clarkson: Fire bombs and incendiaries.

Swent: That was as early as '38, was it?

Clarkson: It was in the planning stages then.

Swent: You were aware of that.

Clarkson: Then the main construction started right after Pearl Harbor.¹ We were at Klondike in Arizona when Pearl Harbor happened, December the 7th. But we didn't have a house radio. I would go out and listen to the news on the car radio. Then we started to get worried. But that was the objective of that mine, too, to be a war producer. Lead and zinc and some copper.

Swent: Let's go back to Sierra City and Indian Valley. These were both gold, were they?

Clarkson: Yes, that was all gold.

Swent: That was all gold. And, of course, that wasn't really a strategic mineral.

Clarkson: No. Sierra City was gold, and Indian Valley was also gold.

Swent: Had you been able to save money on \$250 a month at Buckhorn?

Clarkson: Yes, because all of my expenses were paid. It was a clear \$250.

Swent: So you did have a little bit of a nest egg, then.

Clarkson: Yes, we did. And by that time I was getting pretty good royalties from the reagent feeder, so that--that's a part of the story, too. The first royalty check from American Cyanamid

¹For more on Basic Magnesium, see John Livermore, interview in process, 1998. Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

paid the hospital bill when Claudia was born. It came--as I remember the time--it came the day she was born. {November 1936}

Swent: How nice.

Clarkson: So that, from then on, had started.

Swent: How did you make the decision to go into business for yourself? Was this a big decision?

Clarkson: Well, coming up to 1950? {--A lot of activity in between!}

Swent: No, now. With Edinger.

Clarkson: Well, I developed a nice friendship with Edinger because he was doing little jobs, fabricating jobs, for the foundry around Nevada City and Grass Valley. And we got acquainted. He fabricated a new hangar building at McBoyle's airstrip, and that's really how I got acquainted because I was up at the airport quite often. So we found that we had common interests in things like that, and I was intrigued at the welding work that he was doing; up to that point my work had all been timber construction and no steel construction, in mill buildings and so forth. And he was interested in flying, too. He was not a pilot, but he wanted to be [chuckles]. And so it's getting together on things with mutual interests, my interests. We decided, after I came back from Buckhorn, that we could build up a good business in the area. He had quite a few jobs in sight, so that's the way we started.

But the nice thing about that, too, was--after the foundry days, he built up a shop in Grass Valley, where he could do a lot of the work and supervise. He did that, and I retained my full-time jobs, like at Indian Valley. Some of it in between, like Sierra City. We did that under contract, and then I got a share of the money that we made on the job. So that's how that worked.

And then, when the war broke out--his early experience was shipyard work, in the Seattle area. He was quite a pioneer in electric arc welding methods. He got that earlier from the shipyards, and then he developed welding methods. That started the trend from foundry work to fabricating. Lots of things that they used cast iron for could be improved on by fabricating from steel. That was his forte.

U. S. TREASURY DEPARTMENT
OFFICE OF THE SECRETARY

PROVISIONAL REGULATIONS

ISSUED UNDER THE

GOLD RESERVE ACT OF 1934



JUNE 1, 1937

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1937

The amount of gold certificates issued and outstanding shall at no time exceed the value, at the legal standard, of the gold so held against gold certificates.

SEC. 15. As used in this Act the term "United States" means the Government of the United States; the term "the continental United States" means the States of the United States, the District of Columbia, and the Territory of Alaska; the term "currency of the United States" means currency which is legal tender in the United States, and includes United States notes, Treasury notes of 1890, gold certificates, silver certificates, Federal Reserve notes, and circulating notes of Federal Reserve banks and national banking associations; and the term "person" means any individual, partnership, association, or corporation, including the Federal Reserve Board, Federal Reserve banks, and Federal Reserve agents. Whenever reference is made in this Act to equivalents as between dollars or currency of the United States and gold, one dollar or one dollar face amount of any currency of the United States equals such a number of grains of gold, nine tenths fine, as, at the time referred to, are contained in the standard unit of value, that is, so long as the President shall not have altered by proclamation the weight of the gold dollar under the authority of section 43, title III, of the Act approved May 12, 1933, as heretofore and by this Act amended, twenty-five and eight tenths grains of gold, nine tenths fine, and thereafter such a number of grains of gold, nine tenths fine, as the President shall have fixed under such authority.

SEC. 16. The right to alter, amend, or repeal this Act is hereby expressly reserved. If any provision of this Act, or the application thereof to any person or circumstances, is held invalid, the remainder of the Act, and the application of such provision to other persons or circumstances, shall not be affected thereby.

SEC. 17. All Acts and parts of Acts inconsistent with any of the provisions of this Act are hereby repealed.

Approved, January 30, 1934.

EXTENDING POWERS CONFERRED BY SECTION 10 OF THE GOLD RESERVE ACT OF 1934 AND SECTION 43 OF THE ACT APPROVED MAY 12, 1933

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

WHEREAS, Section 10 of the Gold Reserve Act of 1934, approved January 30, 1934 (Public, Numbered 87, Seventy-third Congress), provides among other things:

"Sec. 10. * * *

"(c) All the powers conferred by this section shall expire two years after the date of enactment of this Act, unless the President shall sooner declare the existing emergency ended and the operation of the stabilization fund terminated; but the President may extend such period for not more than one additional year after such date by proclamation recognizing the continuance of such emergency."

and

WHEREAS, paragraph (b) (2), of Section 43, Title III, of the Act approved May 12, 1933 (Public, Numbered 10, Seventy-third Congress), as amended, provides among other things:

"(2) * * * The powers of the President specified in this paragraph shall be deemed to be separate, distinct, and continuing powers, and may be exercised by him, from time to time, severally or together, whenever and as the expressed objects of this section in his judgment may require; except that such powers shall expire two years after the date of enactment of the Gold Reserve Act of 1934 unless the President shall sooner declare the existing emergency ended, but the President may extend such period for not more than one additional year after such date by proclamation recognizing the continuance of such emergency."

and

WHEREAS, such emergency which existed on January 30, 1934, the date of approval of said Gold Reserve Act of 1934, has not been terminated by international monetary agreement or otherwise, but, on the contrary, continues and has been intensified in divers respects by unsettled conditions in international commerce and finance and in foreign exchange; and

WHEREAS, by virtue of the continuance of such emergency, it is necessary to extend the period during which the powers conferred by said Section 10 of said Gold Reserve Act of 1934 and the powers specified in said paragraph (b) (2), of Section 43, Title III, of said Act approved May 12, 1933, as amended, may be exercised,

NOW, THEREFORE, be it known that I, FRANKLIN D. ROOSEVELT, President of the United States of America, by virtue of the authority vested in me by the Acts of Congress above set forth, and by virtue of all other authority in me vested, recognizing the continuance of the emergency existing on January 30, 1934, do hereby proclaim, order, direct and declare:

That the period of two years within which the powers conferred by Section 10 of the Gold Reserve Act of 1934, and the powers specified in paragraph (b) (2), of Section 43, Title III, of the Act approved May 12, 1933, as amended, may be exercised be, and it hereby is, extended for one additional year from January 30, 1936.

IN WITNESS WHEREOF I have hereunto set my hand and have caused the seal of the United States of America to be affixed.

DONE at the City of Washington this 10 day of January, in the year of our Lord nineteen hundred and thirty-six, and of [SEAL] the independence of the United States of America the one hundred and sixtieth.

FRANKLIN D. ROOSEVELT

By the President:

Cordell Hull,

Secretary of State.

AN ACT To extend the time within which the powers relating to the stabilization fund and alteration of the weight of the dollar may be exercised.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That subsection (c) of section 10 of the Gold Reserve Act of 1934, approved January 30, 1934, is amended to read as follows:

"(c) All the powers conferred by this section shall expire June 30, 1939, unless the President shall sooner declare the existing emergency ended and the operation of the stabilization fund terminated."

Sec. 2. The second sentence added to paragraph (b) (2) of section 43, title III, of the Act approved May 12, 1933, by section 12 of said Gold Reserve Act of 1934 is amended to read as follows: "The powers of the President specified in this paragraph shall be deemed to be separate, distinct, and continuing powers, and may be exercised by him, from time to time, severally or together, whenever and as the expressed objects of this section in his judgment may require; except that such powers shall expire June 30, 1939, unless the President shall sooner declare the existing emergency ended."

Approved, January 23, 1937, 2 p. m.

INSTRUCTIONS ISSUED PURSUANT TO SECTION 8A OF THE PROVISIONAL REGULATIONS
ISSUED UNDER THE GOLD RESERVE ACT OF 1934

To Collectors of Customs in the Continental United States:

Pursuant to the provisions of section 8a of the Provisional Regulations issued under the Gold Reserve Act of 1934, you are hereby instructed, effective immediately, and regardless of whether said Regulations are otherwise complied with, to refuse entry into the continental United States of gold in any form (including gold in its natural state) exported from Mexico, unless there is filed with you a certificate, duly certified by an officer of the Mexican Government, to the effect that such gold was or may be lawfully exported from Mexico. However, these instructions do not apply to

(1) "Fabricated gold" as defined in said Gold Regulations.

(2) Any substance, including gold in its natural state, which you are satisfied, after the filing of an appropriate affidavit by the importer, does not contain more than 5 troy ounces of fine gold per short ton.

HENRY MORGENTHAU, JR.,

Secretary of the Treasury.

Approved:

FRANKLIN D. ROOSEVELT,

THE WHITE HOUSE,

March 11th, 1937.

GENERAL RULINGS

GENERAL RULING NO. 1 UNDER THE GOLD RESERVE ACT OF 1934, AND REGULATIONS
ISSUED PURSUANT THERETO

Pursuant to the authority conferred upon me by Section 8 of the Gold Reserve Act of 1934, and by Section 35 (d) of the Regulations issued thereunder, as amended, I hereby authorize each and every United States mint and assay

office, subject to the conditions in said Regulations and in the general regulations governing the mints and subject to the conditions hereinbelow specified, to purchase at the purchase price prescribed under Section 42 of the said Regulations, as amended, or at such price as may hereafter be prescribed under authority of said section, gold which such mint or assay office is satisfied was refined (or is equivalent to gold refined) from gold-bearing materials imported into the United States, whether such importation occurred before, on, or after January 30, 1934, and whether such gold or gold-bearing materials have been in customs' custody throughout the period in which they have been within the customs' limits of the continental United States.

Before any such gold may be purchased under this ruling, the requirements of paragraph (1), (2), and (3) of Section 32 of the regulations issued under the aforesaid Act must be shown to have been complied with, and in addition the depositor shall have filed an affidavit in duplicate on Form TQ-20, together with two duly attested copies of the settlement sheet covering the gold-bearing materials imported; provided, however, that any person hereafter importing gold bearing materials and offering the gold extracted therefrom for sale to a mint or assay office other than the mint at San Francisco or the assay office at New York must have caused the copy of the entry described in paragraph (1) of said Section 32 and the attested copy of the record described in paragraph (3) of said Section 32, to be forwarded to the mint or assay office to which he is offering the aforesaid gold for sale instead of to the mint at San Francisco or the assay office at New York; and provided further, that gold extracted from gold-bearing materials heretofore imported into the United States may be sold to any United States mint or assay office, but before it is purchased by any other mint or assay office than the one to which the copy of the entry described in paragraph (1) of said Section 32 and the attested copy of the record described in paragraph (3) of said Section 32 were sent, the depositor of such gold shall have caused the aforesaid copy of entry and attested copy of record to be forwarded by the mint or assay office in which they were first filed to the mint or assay office to which he proposes to sell such gold.

The declaration described in paragraph (1) of Section 32, whether made before or after the promulgation of this ruling, shall be deemed to constitute a declaration of intention either of exporting the gold extracted (or the equivalent of the gold extracted) from the gold-bearing materials with respect to which such declaration was made, or of selling the same in accordance with this ruling.

No gold shall be accepted for purchase under authority of this ruling unless it is delivered to the mint and all of the terms of this ruling complied with within seven months from the date of the formal entry into the United States of the gold-bearing materials from which it was extracted.

H. MORGENTHAU, JR.,

Secretary of the Treasury.

Dated: FEBRUARY 20, 1934.

GENERAL RULING NO. 2 UNDER THE GOLD RESERVE ACT OF 1934, AND REGULATIONS
ISSUED PURSUANT THERETO

Pursuant to the authority conferred upon me by the Gold Reserve Act of 1934 and by Section 35 (d) of the Regulations issued thereunder, as amended, I hereby authorize each and every United States mint and assay office, subject to the conditions in said Regulations, and in the general regulations governing the mints and assay offices, and subject to the conditions hereinbelow specified, to purchase at the purchase price prescribed under Section 42 of said Regulations,

as amended, or at such price as may hereafter be prescribed under authority of said section, from any person regularly engaged in an industry, profession, or art in which gold is used, processed, or manufactured, gold filings, clippings, pieces, and the like which were not acquired by such person in such form, but which have accrued directly from, and as a result of, the legitimate, customary, and ordinary conduct of such person's industry, profession, or art.

No deposit of such gold shall be accepted unless accompanied by an affidavit properly executed in duplicate on Form TG-23. Such gold may be purchased even though the depositor has no license to acquire, hold, or import said gold.

H. MORGENTHAU, JR.,

Secretary of the Treasury.

Dated: MARCH 2, 1934.

GENERAL RULING NO. 3 ISSUED UNDER THE GOLD RESERVE ACT OF 1934 AND THE REGULATIONS ISSUED PURSUANT THERETO

Pursuant to the authority conferred upon me by section 8 of the Gold Reserve Act of 1934, and by subdivision (d) of section 35 of the Provisional Regulations issued thereunder, as amended, I hereby authorize each and every United States mint and assay office, subject to the conditions in said regulations and in the general regulations governing the mints and subject to the conditions hereinbelow specified, to purchase at the purchase price prescribed in section 42 of said Provisional Regulations, as amended, or at such price as may hereafter be prescribed under authority of said section, gold contained in deposits of silver which are receivable by the United States mints and assay offices under the Proclamation of August 9, 1934, provided such mints and assay offices are satisfied—

- (a) that the deposit of gold and silver does not contain more than 200 parts of gold in 1,000 by assay;
- (b) that the gold has not been held at any time in noncompliance with the Act of March 9, 1934, any Executive Order or Orders of the Secretary of the Treasury issued thereunder or in noncompliance with any regulations prescribed under such orders or licenses issued pursuant thereto, and has not been acquired or held, transported, melted, or treated, or held in custody in violation of the Gold Reserve Act of 1934 or any regulations or licenses issued thereunder; and
- (c) that the gold was not mixed with such silver for the purpose of selling to the United States gold, which was not eligible for purchase by the United States under subdivisions (a), (b), or (c) of section 35 of the Provisional Regulations issued under the Gold Reserve Act of 1934 or under general rulings No. 1 or 2 issued under subdivision (d) of said section 35 of said regulations.

STEPHEN B. GIBBONS,

Acting Secretary of the Treasury.

AUGUST 31, 1934.

GENERAL RULING NO. 4 ISSUED UNDER THE GOLD RESERVE ACT OF 1934 AND THE REGULATIONS ISSUED PURSUANT THERETO

Pursuant to the authority conferred upon me by section 8 of the Gold Reserve Act of 1934, and by subdivision (d) of section 35 of the Provisional Regulations issued thereunder, as amended, I hereby authorize each and every United States mint and assay office, subject to the conditions in said regulations and in the general regulations governing the mints and subject to the conditions hereinbelow specified, to purchase at the purchase price prescribed in section 42 of

the Provisional Regulations, as amended, or at such price as may hereafter be prescribed under authority of said section, from any person regularly engaged in an industry, profession, or art in which gold is used, processed, or manufactured, gold filings, clippings, pieces, and the like which were not acquired by such person in such form, but which have accrued directly from, and as a result of, the legitimate, customary, and ordinary conduct of such person's industry, profession, or art.

The mints and assay offices shall not purchase any gold under this ruling unless the deposit of such gold is accompanied by a duly executed affidavit on form TG-27 and unless they are satisfied that the gold was acquired, held, melted and treated, and transported in accordance with a license issued pursuant to section 23 of the Provisional Regulations, or as permitted without a license under Article II or section 21 of such regulations.

No mint or assay office shall purchase under this ruling any gold filings, clippings, pieces or the like from any person who has acquired such gold in such form from any other person.

H. MORGENTHAU, JR.,

Secretary of the Treasury.

NOVEMBER 26, 1934.

GENERAL RULING NO. 5 ISSUED UNDER THE GOLD RESERVE ACT OF 1934 AND THE REGULATIONS ISSUED PURSUANT THERETO

Pursuant to the authority conferred upon me by section 8 of the Gold Reserve Act of 1934, and by subdivision (d) of section 35 of the Provisional Regulations issued thereunder, as amended, I hereby authorize each and every United States mint and assay office, subject to the conditions in said regulations and in the general regulations governing the mints and assay offices and subject to the conditions hereinafter specified, to purchase at the price prescribed in section 42 of the Provisional Regulations, as amended, or at such price as may hereafter be prescribed in such section, gold refined from sweeps purchased, subsequent to the date of this ruling, from a United States mint or assay office.

The United States mints and assay offices shall not purchase any gold under this Ruling unless the deposit of such gold is accompanied by a duly executed affidavit on form TG-28.

H. MORGENTHAU, JR.,

Secretary of the Treasury.

DECEMBER 31, 1934.

III BROADENING EXPERIENCE IN CALIFORNIA AND ARIZONA

[Interview 3: February 9, 1998] ##

Swent: When we had stopped, you had left Buckhorn and gone back to Grass Valley, and you looked up your old friend, Ted Edinger.

Clarkson: Right.

Updating the Bigelow Mine in Sierra City, California

Swent: Let's go from there.

Clarkson: Ted Edinger was managing the old Miners Foundry in Nevada City. He was loaded with good ideas, doing repair work and remodeling work and furnishing new equipment to existing mines. There were quite a few small mines that were being renovated. What that led to was the Bigelow Mine in Sierra City. It had an old stamp mill, all water-powered, with Pelton wheels. The manager and company that was opening up that mine wanted to update it by adding a ball mill and flotation machines and so forth.

Swent: Why were they opening it up?

Clarkson: It was one of the known old gold mines in the Sierra City area, and the company or fellow that acquired it was opening up the mine and getting the old stamp mill operational but, at the same time, modernizing the metallurgy by adding a ball mill for fine grinding and flotation machines.

Swent: The ball mill would replace the old stamp mills?

Clarkson: No, no. It was in the design of it. Edinger and myself and the engineering staff that they had at the Miners' Foundry, utilizing the stamps as secondary crushers and then the ball mill for the fine grinding for flotation, because the stamps in

the old days for gold recovery, the stamps didn't grind the ore fine to liberate all the gold, so the stamps were actually still used as a crushing stage, in the crushing phase of the ore. And then the stamp mill output went directly to a ball mill for the fine grinding required for flotation.

Swent: You were adding, you said, a ball mill.

Clarkson: Yes.

Swent: There had been no ball mill before?

Clarkson: No, no, just the stamp mills--the stamps and amalgamating plates and a concentrating table. That was a 20-stamp mill, too, four 5-stamp battery boxes.

Swent: Flotation was not new at that time, was it?

Clarkson: No, no. Flotation was well along. But a lot of the old mills in California, like the Standart mine, where our next job was, they had a stamp mill with amalgamation plates and a concentrating table, Wilfley-type table. So in order to use flotation, a fine-grinding stage had to be added, which the stamps were not capable of.

Swent: So that was why you introduced the ball mill then.

Clarkson: Yes. And the Miners' Foundry--Edinger then had the Miners' Foundry updated to where they were fabricating small ball mills and other classification equipment. Another mechanical step with the ball mill, beyond stamps, was classification. Classifiers had to be added into the grinding circuit to provide a finer grind for flotation recovery.

Swent: I'm trying to figure out why this happened right now.

Clarkson: Well, it had been going on all during the thirties; the bigger, the larger operators, like the Empire and the Idaho-Maryland and Newmont in the Grass Valley area, the Golden Center Mine, they still retained the old stamp mill section, but in order to go on to flotation, there had to be fine grinding methods. That was predominantly the ball mill method. All of them were still using stamps, but the stamps filled the role of crushing. After the primary crusher, usually a jaw crusher, stamps for the secondary crusher, then that fed to the ball mill.

For classification, a part of the stamp mill design, before the crushed ore could leave the stamp battery, it had to pass through a screen. All of the classification was then

accomplished by screening, rather than by gravity classification. In that step, after screens, which had to be relatively coarse to get the crushed ore through the screens, then it went into a classification, which was accomplished mechanically and also by gravity. The fines that were ground fine enough could overflow. There was a density factor. And the classifier returned the oversized, in closed circuit, back to the ball mill.

Swent: How much of this was Edinger fabricating there?

Clarkson: Classifiers, mechanical classifiers, ball mill and, of course, Edinger jigs. Flotation machines were fabricated, too, {but by other companies}.

Swent: He was making all of those right there?

Clarkson: No, not the flotation machines, but the primary crushers, classifiers, and ball mills. And then other mill-like equipment for final recovery, amalgamating barrels. An amalgamating barrel was just a miniature cylindrical batch mill, a lot like a ball mill, but usually for--and that was for further grinding, after the concentration, to free the gold from sulfide particles so that it could be amalgamated.

Developing New Designs for Ore Cars and Jigs

Swent: And this was more advantageous than going out and buying these things ready-made?

Clarkson: No, there were other companies, but as a small company, the Miners' Foundry, they had most all cast and boilermaker-type of work, using riveted steel, like for the shells and so forth, but not using any welding, arc welding methods. Riveting and castings made up the components of the ball mill.

I'll inject this. The Miners' Foundry also developed a new design of ore car. It was a known design, but Edinger adapted fabrication to it, using lots more steel instead of casting parts. It became a very popular mine car. It was known as a Swedish rocker-dump car, but Edinger and Miners' Foundry updated the design, using lots more steel.

Swent: I noticed in one of these articles it mentioned using an Edinger jig.

Clarkson: Yes. He developed a mineral jig, a diaphragm jig. I got in right in the beginning of that because I was one that applied it in the {mill grinding circuit--the Indian Valley mill was an ideal place for one}.

Swent: How was this different from other kinds of jigs?

Clarkson: Well, jigs had been in use in the market for larger companies, but Ted came up with the idea of a diaphragm, using the same diaphragm that a diaphragm pump used that was widely used for pumping the underflow from thickeners. This diaphragm, with an eccentric action, pulsating the diaphragm, created the pulsation for the jig to sift the gold down and some other heavies down through a screen. But you also had to have a media in it; sometimes just shot was used, lead shot or steel shot. The lead was heavier. But then also we found that we could use crushed chrome ore that--carefully sized--was a good jig media to use. We called it the jig bed.

He also had a good market for it in the little gold mine mills, especially in the Mother Lode country, and Nevada--I put one in at the Grand Reef Mine {Klondyke, Arizona} in updating, modernizing the old mill there. That was our game, was to go into existing mills and add--like a cyanide section, we had two jobs like that. Or build a complete small mill. We were not looking for the big jobs. These small mines around the country that needed some improvement, updating, and adding equipment for better recovery. So that took up that period of time.

And a heck of a lot of good experience, too, on my part. That experience led to bigger responsibilities.

Swent: Which we'll get to in just a moment. But I'm getting a picture of a lot of innovation at all these places. Every place is different, isn't it?

Clarkson: Yes, each one was different and a new challenge. When I look back on--how did I go to so many different ones in such a short period of time? It must look like I was a person that was always job-jumping, looking for something better [chuckles]--in this case, it was always an experience of finishing up a job and then getting on to the next one that was available.

Swent: And I suppose you learned something?

Clarkson: Each one. And established new contacts, new friends, and people worked with--I had some that followed with me. The next job, why, I would take them from the last job and start with the next.

Swent: So your first job {after Buckhorn} there was Sierra City. You added the ball mill and the flotation circuit.

Clarkson: And the classifier.

Swent: And the classifier. And then--

Clarkson: As well as repairing the old, existing equipment, making it an operable mill, making certain everything was working, and then turning it over to the people that would run it. Then of course they picked out crews that usually already existed in the area for the operating crew afterward.

Swent: Did you take anyone with you from there to the next job?

Clarkson: Well, I didn't take anyone from Sierra City to Greenville. That's where it started--but I did bring fellows from the Buckhorn job to Greenville because there was room and a need for them there, so that led to a lot of new happenings. Where I went to next and where some of them went on to other places.

Reconditioning the Gold Stripe Mill near Greenville, California

Swent: So Greenville was your next step, then, after Sierra City?

Clarkson: Yes. I had kept--Edna and Claudia, our baby, our girl--we lived in Sierra City. We found a house there while I was finishing up that job. When that was finished, then I moved them to Greenville. But before the Indian Valley job was--we got a little job remodeling and getting another existing mill started up in the Greenville area. It was known as the Gold Stripe Mine.

Swent: This was in Greenville.

Clarkson: It was out of Greenville, a few miles, four or five miles.

Swent: What did you do there?

Clarkson: Just reconditioned and repaired. They had a ball mill and no flotation. It was all amalgamation and gravity. And the mill had been shut down for some time and needed repairs and some rearrangement of equipment to get it ready to run for new mining activity. They had been developing the mine, and the mill had been shut down for a long period. So that was just an updating job. I don't remember that we even furnished any new

equipment to it. But I had a crew that was skilled in doing that. {Incidentally it was where I first met Dick Krebs back in 1935--he had been working in that mill.}

Then the Indian Valley job was ready to go, so this was just a little fill-in job in the meantime, to keep working.

Swent: So was Edinger the one that found the jobs?

Clarkson: Yes, he was always the one because they would look to the Miners Foundry for their needs, even some mine supplies. Now, incidentally, the old Miners Foundry in Nevada City is just down off from Mott Street. It has been made into a museum and a kind of community center, where they have retained the old foundry buildings, they have facilities there for community activities and so forth. I haven't visited it for several years now, but the last occasion was to go to a fiftieth anniversary for a long-time mining couple, {Bob and Cecille Baker}.

Swent: In the foundry?

Clarkson: In the foundry. They were Nevada City natives, too, but they had been in Stibnite and other Bradley jobs and here in Nevada. His last job before he retired was for Newmont and then one of the other companies, out in the Battle Mountain area.

Swent: What was his name?

Clarkson: Bob Baker. He passed away, but Cecille Baker, his wife, still lives in Nevada City. She's quite active in senior citizen activities over there. We keep in touch. That goes back to the Grass Valley, Nevada City, days. He worked for Bradleys, their Spanish Mine near Washington, down on the Yuba River from {Washington}, Nevada City. He was badly injured in a mine accident--he was a metallurgist, Berkeley, but he also had to work in the mine work sometimes, too. It wasn't always mill work.

Designing and Rebuilding the Standart Mill for the Indian Valley Mining Company

Swent: So after the Gold Stripe, then, you started with--

Clarkson: Indian Valley. That was the next job.

Swent: And you moved your family up to Greenville, did you?

Clarkson: Had already moved because this Gold Stripe job was just a waiting job, waiting for the money and the organization to get the Indian Valley Mill started. The Miners Foundry, through Edinger, was providing the equipment for that job. But the company, the Indian Valley Mining Company, was actually running the construction. That's where I came into it, was to provide the final design and to put it on stream.

A millwright from Tonopah headed up the construction. Then he worked for me--

Swent: What was his name?

Clarkson: Guy Burch. He was a well-known millwright here in Nevada.

Swent: And this was the Standart Mine, the mill for the Standart Mine.

Clarkson: Yes. Indian Valley Mining Company.

Swent: There's an article about it in the *Mining Journal* for March 1940. Perhaps there are things you would like to add to that article.

Clarkson: You have a copy of it.

Swent: I have a copy of it.

Clarkson: I provided the flow sheet there for the article.

Swent: Right. What were some of the special challenges there?

Clarkson: Well, the first construction was pretty much routine. Everything was just running smoothly when a disastrous fire burned the mill in February of 1939, I guess it was.

Swent: Soon after you had been--or before you moved there?

Clarkson: No, no. We were established. We didn't yet have a house at the mine site; we were living in a hotel suite in Greenville. This all happened just in the period when Curt was born [chuckles].

Swent: Oh! And he was born in Greenville.

Clarkson: Yes, he was born in Greenville. This was the beginning of the formal partnership that I had with Ted because after the mill was burned, a lot of the machinery had to be reconditioned. We trucked it back down to Nevada City, to the Miners Foundry for

them to recondition all of the equipment that could be saved. So that was--Ted was involved in all of that.

Swent: I thought you were already in partnership with him.

Clarkson: No, no. That was really the beginning of our formal partnership. We were in partnership, but his name was always with the Miners Foundry up until that point. So at that point, we made [taking out a piece of paper]--I'll show you. This became our--

Swent: Okay, here we are. Fabrication, Service, Engineering, the card says. Plant design and construction, general engineering contractors, Nevada City. And there's your name, J. R. Clarkson, equipment manufacturing and installation. So you formed a new company then.

Clarkson: Well, it was really just a partnership, but it was full-time then for Edinger because at that point in time, most of the foundry work had all been closed down.

Swent: Had he owned the foundry?

Clarkson: No, no. It was a family-owned foundry. He came in to work to resurrect the foundry with fabrication methods instead of foundry methods. So then the foundry in that period of time was totally closed down, so we were the only still-functioning organization, full-time for Ted and then a period after the shutdown of the Indian Valley Mine, it was full-time for me. But each time, ending with the Fresno Banner and then my going on to Klondyke, why, then it was the Klondyke that we--the war, Pearl Harbor--so then we just conveniently dissolved our partnership.

Swent: I see. Well, let's go back to Indian Valley. You went up there in '38, I think?

Clarkson: In 1938.

Swent: You were just getting settled there and--what caused the fire?

Clarkson: Apparently, it was determined that it was caused by an electrical fire, an electric heater that was left on in an area where there was a wooden floor in the inside mill office.

Swent: Oh, my goodness.

##

Swent: What was the date of the fire?

Clarkson: February or late January, 1939.

Swent: And Curt was born?

Clarkson: He was born in February, Groundhog Day.

Swent: So you had your hands full.

Clarkson: Yes. The manager--I'll show you a picture of him--teased us, that he didn't even know that Edna was pregnant, and when I told him about the event, I told him that I wouldn't be up to the mill or something because of that event, why, he was totally surprised [laughs]. But I'm sure that he knew. He was a Swede, and he liked to be surprised by something. That was a nice job. We got lots of attention on that job. It was written up in the local paper.

Swent: The *Mining Journal* had an article about it, too.

Clarkson: [showing photograph] This was the new mill after--it was rebuilt of steel construction. This was the mine site.

Swent: Nice buildings, yes. Did you live up there at the mine?

Clarkson: Yes. This was Johnson's house up here. {G. L. (Gus) Johnson.}

Swent: He was the manager?

Clarkson: Yes. His wife was Patsy. They met in Alaska. The company built a house for us down by the mill. This was the miner's--this was the timber shed; this was the mine--this part is the adit to the mine, was right here. This was the old stamp mill up there on the hillside, and this was Johnson's house.

Swent: And your house?

Clarkson: Just out of sight, over this area of the picture.

Swent: There's a clothes line there.

Clarkson: Oh, I see it now. That had to be some of the miners. It looks like some long drawers there. {One bachelor had a little place back of those mine buildings.}

Swent: Okay. G. L. Johnson. What does G. L. stand for?

Clarkson: Gus.

Swent: Gus. Gustav, I suppose. Well, that was a big job.

Clarkson: That was a big job then--more mine development needed. World War II, gold started to--the company didn't want to continue with it because of impending war problems. They decided to shut it down.

Swent: They were not shut down by L-208? [War Production Board order which closed gold mines during World War II.]

Clarkson: No, the shutdown came a little before. The company decided that they were not going to--they had to do quite a lot more development in the mine, and so they--and the mill was sold and dismantled and moved up to Cottage Grove, Oregon, for a copper job.

Introducing Automation for Sampling and Ore Traffic Control

Swent: I see. So what was so special about the mill there?

Clarkson: Well, some of the recovery methods that I developed, and then the methods of jigging and (Edinger) amalgamation and the (Otto Brown) flotation methods, plus automation: automatic sampling and automatic controls (Bob).

Swent: That was something new.

Clarkson: Yes, that was new. Something that was also new was a time control for traffic signals, which was--some of the early electronics used that type of equipment to control the timing of in-stream samplers and so forth.

Swent: Traffic in the mill, you're speaking of.

Clarkson: Yes. Ore traffic.

Swent: Whose idea was that?

Clarkson: Otto Brown was one that I leaned on a lot. He was a metallurgist with American Cyanamid. We used to call him a mill man's mill man because he was always--he was the one that led me out to Buckhorn because somewhere along the road, in California, we had developed a friendship, and Cyanamid was just getting the Fagergren flotation machines, building up a good market. Almost every one of these jobs, because of my ties, included Fagergren flotation machines.

A circle of friends in the business, and getting around with new developments and so forth, that meant an awful lot. Friends along the way helped me along my route.

Swent: Now, you were still, of course, producing and marketing your reagent feeders.

Clarkson: Yes. {1935}

Swent: Was Edinger making those?

Clarkson: No. That was entirely Cyanamid. That's what opened the door for me with Cyanamid. That started in 1935. I had the feedback of jobs, potential jobs, where the feeder was known and working with the Cyanamid fellows: Otto Brown, Kelly Krebs, and several others that were field metallurgists for American Cyanamid, selling their mine chemicals, flotation reagents. The feeder had become very much a part of that. And then also in the same period of time, the Fagergren flotation machine.

Swent: Who was making the feeder?

Clarkson: Cyanamid was. {1936}

Swent: They were making it by now.

Clarkson: Yes. I made the first ones and sold several in Grass Valley, in the Mother Lode area, Sierra City and Downieville and places like that and on south--Jackson. {1935}

Swent: By now, by this time, American Cyanamid are manufacturing them.

Clarkson: Yes.

Swent: And marketing them.

Clarkson: Yes. They actually got underway in 1936.

Swent: Yes, that's when you had your agreement with them. But you got a royalty.

Clarkson: Yes. That helped, of course. I think I told you the story about the first royalty check.

Swent: The first check that came when Claudia was born. {November 1936}

Clarkson: That's right. But it was a tremendous help in putting my name out because here I solved one problem, so then I started being

recognized as a good troubleshooter for these operations. And that was in fact what I was doing at the Spring Hill Mill. When I worked there, I was also still working at the Idaho-Maryland. So when I look back on it, I don't know how I got all the jobs done that I was getting involved in.

Swent: You did a lot.

Clarkson: I guess I had the urge to always be busy, doing something better.

Swent: At Standart {Indian Valley}, what was the special thing that you learned or that you accomplished there?.

Clarkson: Improvements in metallurgic processing, especially in the jigging and the flotation and the amalgamation methods.

Swent: And then there was something special about the pumps, wasn't there?

Clarkson: No, nothing that I think of. {Just a little innovation.}

Swent: The article mentioned the pumps selected especially for sand pump use.

Clarkson: Oh, well, that was just a mechanical improvement in recirculating flotation middlings because centrifugal pumping for slurry was still pretty crude back then, back in the thirties. I just made some improvements in the application of sand pumps pumping slurry. Wilfley was the predominant one in that time. Wilfley pumps were the best pumps available through the thirties.

I used a pump that was much lower cost than the Wilfley pump. Instead of repairing the pump, when the pump was worn out, it was more cost-effective and efficient just to take it off and put in an entire new pump on. I don't even remember the name of the pumps that I used then. But it worked very well there. It was a low-cost function for a small flow operation and not very abrasive.

Swent: When did you begin to get the idea of the valve?

Clarkson: Well, that came with the Krebs cyclone development. That's up in the fifties, after Stibnite. Well, after the Clarkson Company was--what led to the Clarkson Company was the American Cyanamid going out of the machinery business. Their two products in metallurgical work was the Fagergren flotation machine, and the Clarkson feeder. The two went together. So

Wemco, Western Machinery Company, was buying the Fagergren flotation machine market, equipment and all from Cyanamid.

Swent: But that's much later. {Late forties}

Clarkson: That was in the late--actually started in 1949 when I was notified by Cyanamid. And Clarkson Company was started in January 1950.

The Hazards of Carbide Lamps

Swent: You had said earlier that you wanted to tell a story about the Standart Mine, an outhouse story of some kind.

Clarkson: Oh, you have probably seen the picture. As I remember, where the laundry was and the clothes line next to the outhouse.

Swent: That was probably a change room and wash house?

Clarkson: [showing photograph] This was the change room building, and this was the outhouse.

Swent: Right, by the portal to the mine.

Clarkson: Yes. You can see the tracks.

Swent: The tracks going into the mine, yes.

Clarkson: This miner came out, and it was--I think it was probably a two- or maybe even a three-holer {privy}. But he was alone there. It was common practice to control the odor and so forth to dump the spent carbide from the carbide lamps down--sprinkle it over--using it like lime. But this miner had his lamps, probably because a miner always carried a hand lamp as well as his cap lamp. Hand lamps like the one up on top there [demonstrating]. He knocked out the spent carbide out of the lamp down the other hole that he was sitting by.

His next thing after that was to light up his pipe. He lit up his pipe and apparently tossed the match down the other hole. When you emptied your empty lamp, why, lots of times there was still live carbide--and the moisture down there and so forth. But anyway, there was quite a space there where the gas had accumulated, and when he tossed the match down, it exploded [chuckles], and it blew him out through the door. Blew the door open. As I remember it didn't knock the door

off, but it bruised up his face a bit. But that was a big joke at the mine there for a long time, about that explosion.

Swent: I'm sure he never lived that down.

Clarkson: And the story continues. The nice thing about it, he was not seriously hurt. But carbide was--quite a few people were killed by carbide explosions. My kid days, at home, places that could afford it that didn't have electricity--and there was lots of them--some had carbide lights in their business or in their home, with the generator outside, just like some used for carbide welding work. I remember a fellow re-charging his carbide generator for his lighting system, accidentally sparks--it blew him clear up on the roof of his house, and killed him, too. But quite a few carbide lighting systems were then in use, and with the generator outside, put below ground, with a lid on it, and the gas, like natural gas, piped into the house for lighting and such uses like that. There was quite a few accidents.

As well as when carbide welding equipment came into use before--the generator was a big vessel, and it was a very explosive gas, the acetylene gas, they used. Accidents did happen with it.

Swent: What sort of living accommodations did you have there? Did you have electricity in your house at Standart?

Clarkson: Yes, oh, yes. Except we didn't have modern plumbing. All the houses had outhouses--privies.

Swent: What about water in the house?

Clarkson: A tap outside. From the tap outside, packed the water in. The house that we had, we put in a kitchen sink, so the water just drained away outside. Edna did have a sink but not running water inside.

Swent: I see. But you had electricity.

Clarkson: Yes. We could use that for electric iron and washer.

Swent: How about refrigeration?

Clarkson: We didn't have refrigeration there. I remember we got our first refrigerator from Montgomery Ward. I guess when I was doing these jobs around the Surcease Mine at Oroville and the Fresno Banner at O'Neal's, California.

Swent: What was the first one you mentioned?

Clarkson: I guess maybe I didn't mention that one. That was another job that we put a cyanide addition on. The Surcease Mine. It was north of Oroville, above the river.

Swent: And this was after Standart?

Clarkson: Yes. That was one of the first--the second job, because the Cherokee Mine was the first one. But the Cherokee Mine mill job was started while I was still at the Standart. Ted had rustled that job and had it ready to go. I was still doing shutdown work at Indian Valley, and the two mines were just, oh, not more than a mile and a half apart.

Swent: Were you able to stay on in your house at Indian Valley?

Clarkson: Yes, oh, yes. We didn't move away from there until I finished all of the shutdown, all of the clean-up, and everything. And then I moved the family down to Brown's Valley, down there near Marysville. That was a good, central location while I was on these short-term jobs {and Edna's brother Jack was a mine shift boss there at Newmont's operation}.

Swent: So what did you do if you had no refrigeration?

Clarkson: Cellars or coolers. What we called a swamp cooler was a burlap sack with dripping water to keep them wet--{sacks draped over a frame arrangement}.

Swent: There would be no ice even, would there?

Clarkson: No, no. Brown's Valley, as I recall, had a refrig[erator] by then. Edna's brother, Jack, was a mine foreman at Brown's Valley; the Newmont Company had two mines in Brown's Valley that they were operating {Northstar and Dannybroge}. So that was a good location for her.

Swent: What did you do for milk?

Clarkson: Well, there were dairies in Greenville. We had to go to a store for milk, of course. But there were dairies in Indian Valley.

Swent: How far was Greenville?

Clarkson: Just a mile and a half, down the mountain.

Swent: So Edna would drive downtown when she--

Clarkson: Yes. Then, of course, up until--well, we didn't need to in Grass Valley, of course, and in Nevada City, but in the early days at Stibnite and Buckhorn and places like that, there was condensed milk. That's what we always relied on.

Swent: In cans.

Clarkson: The canned milk.

Adding Cyanide Sections at Surcease and Cherokee

Swent: So what did you do at the Surcease?

Clarkson: We added a cyanide mill section. They had the concentrator developed to the point where they either had to ship the flotation concentrates either to a smelter or to another cyanide mill, so we added a cyanide section. We did the same thing to the Cherokee Mine at Greenville. That was what that little job consisted of.

Swent: Where did you get the equipment for that?

Clarkson: A lot of it we fabricated; tank and diaphragm pumps and so forth. By that time, Ted had--that was at the point where he set up his fabricating shop in Grass Valley. Then the Miners' Foundry was closed down, and that was--

Swent: So he moved to Grass Valley.

Clarkson: Well, he lived in Nevada City, but he started the shop in Grass Valley.

Swent: And the Fresno Banner?

Clarkson: That came after the Surcease. We'll keep this in order. After the Surcease job, then we moved on down to the Fresno Banner.

Swent: And where was that?

Clarkson: O'Neal's was the nearby town and post office. It was up out of the valley. Incidentally, Friant Dam was being built. I have quite a few 8-millimeter movies that I took of the Friant Dam construction.

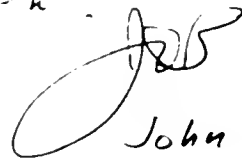
Swent: This was down near Fresno, then.

18/5/46

R.J.C. -

Robert Clarkson

See case you drew &
 guess it, I am very
 pleased with the success
 of the road unit - on the
 set up and command you
 highly for such an excellent
 installation.



John D. Bradley

Publication of excerpts or summaries of this paper, not to exceed one-third of the full text, with appropriate credit line, by daily, trade or business publications is welcomed.

OPERATING DATA ON ROD MILL LINER DESIGN*

by

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This paper has been prepared because of renewed interest in the use of rod mills for primary grinding, especially in large operations using comparatively large units, and it is hoped it will add to the fund of new information rapidly being accumulated by other operators. Most of the information given herein relates to liner design and follows the development of rod mill liners from the initial dismal installation that ground a bare 80,000 tons at prohibitive cost to the present highly satisfactory liners that grind up to half a million tons a set at costs well within economic limits.

The experiences and data given herein have been collected from the operation of a single unit installation — a 9'-6" inside shell diameter by 12'-0" long Marcy low level discharge rod mill installed by the Bradley Mining Co. at the Yellow Pine Mine at Stibnite, Idaho. The installation of this mill was completed and its operation commenced in the late months of 1946, and at this writing liner design has progressed sufficiently so an interesting picture may be presented showing the evolution of the liners from the first failing set to the present long-lasting liners.

Normal full rod charge operating capacity is in the range of 100 dry tons per hour of medium-hard granitic antimony-gold bearing ore as received from a conventional open circuit primary-secondary crushing plant. Although capacity of the mill and the size of the discharge product is directly affected by coarseness and or fineness of the feed, nevertheless control with full rod charge can easily be maintained at 15 percent below and 10 percent above normal 100 dry tons per hour feed rate without damage to the liners.

Fixed conditions and mechanical arrangement of the mill include the following:

R. P. M.	16.6
F. P. M. inside liners	470
Power, synchronous motor	450 H.P.
Rod Charge, $3\frac{1}{2}$ " dia. max. size	54 tons
Feed arrangement, direct spout	
Mill arrangement, open circuit	

* Presented at the 1950 Metal Mining Convention and Exposition, Western Division, The American Mining Congress, Salt Lake City, Utah, August 28-31.

Typical screen analysis of Rod Mill feed and discharge products are as follows:

<u>Feed</u>	
<u>Size</u>	<u>Percent weight on this size</u>
Plus 1.5 inch	5.20
Plus .5 inch	49.40
Plus 10-mesh	35.80
Plus 48-mesh	5.67
Minus 48-mesh	3.93

<u>Discharge</u>	
<u>Size</u>	<u>Percent this size</u>
Plus 10-mesh	1.34
Plus 20-mesh	20.05
Plus 48-mesh	34.10
Plus 200-mesh	16.80
Minus 200-mesh	27.71

Average pulp density is held at 75% solids for best results. Rods are added tri-weekly and at the same time useless rod scrap is removed from the exposed surface of the rod charge. Average rod consumption is 1.28 lbs per dry ton and power consumption is 4.10 KWH per dry ton milled.

The foregoing gives the basic operational functions of the primary unit all of which were satisfactory and well adapted to the balance of the plant, provided an economical liner design could be developed.

The first set of liners were of wave design, using 60 waves in the shell circle. The waves wore completely out in less than 100,000 tons with a consequent rapid decline in capacity when the liners smoothed out to almost an entirely smooth cylindrical surface. Much slippage of the rod charge was noted at this stage and though the plates were still quite thick, the balance wore out quickly.

The first step after the second set of liners was obtained was by changing to 40 waves in the circle as indicated by our first illustration. The results were slightly improved on the second set though still in the prohibitive cost range of 6 cents per ton milled with barely 2 months of service. At this stage when the second set wore cylindrical, 1½" mild steel bars were bolted in, forming twenty rows of lifters and to our amazement these gave another 80,000 tons and the back plates lasted through one more set of mild steel bars and a set of 2 x 8 manganese bars to a total of 425,000 tons. This gave sufficient information to proceed on a suitable design of replaceable bars with the following objectives in mind: (1) to attain the longest possible operating period without removal of the rod charge for a complete relining job, and (2) to retain the most efficient liner profile throughout their entire operating life, thus avoiding declining grinding efficiency in the final stage of wear.

In the interim of development and to further experiment, one set of bars cast integrally using high chrome material was used with favorable results though a considerable decline in grinding capacity was noted as the bar projection gradually evolved into an elongated mildly wave effect. When the decline reached a certain point it was necessary to discard the set, though a considerable thickness of metal still remained. These liners, nevertheless, are credited with giving a substantial reduction in cost, 1.9 cents per ton as compared to the first set at 6 cents.

In the next set of replaceable cap liners certain improvements were incorporated to avoid past bad experience with broken bolts, liner shifting, etc. However

castings with too great tolerance still did not entirely relieve this problem and the wear progress in the valley between bars became too great to obtain best results from the second set of bar cap installation.

In the latest illustration attention is drawn to the appearance of wear progression and how well the lifting or traction contour is retained throughout thus maintaining very close to peak mill efficiency at all times.

For the final set as illustrated, it is fully anticipated that the plates will handle 1,000,000 tons of ore using 3 sets of bar caps at an overall cost of 1.45 cents per ton. Another advantage of this procedure is that a year and a half of operation without removal of rod change for complete liner replacement can be expected.

Manganese steel composition as used in the foregoing liner plates is of 13 percent manganese, 1.2 carbon, .60 silicon phosphorous, .10 maximum sulphur, .05 maximum. For lifter bars added 2 percent chrome to above and heat treated to 1900°F, one hour per inch thickness, then cold water quenched.

In closing, it might be mentioned that our first set of end liners lasted 1,300,000 tons. Our last set have ground 1,100,000 tons to date.

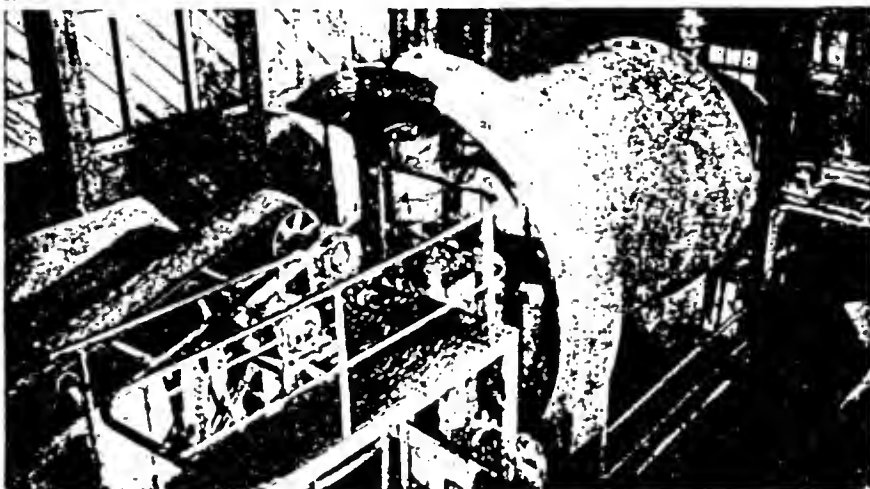
ACKNOWLEDGMENTS

The author wishes to acknowledge the excellent cooperation of the Anaconda mill staff for information given from their nearly parallel experience with the same size mill and the Marcy Division of Mine and Smelter Supply Company and the Eimco Corporation for their assistance in bringing about a liner design contributing to a favorable economy of operation.

—oOo—



ORIGINAL MARCY
CORRUGATED LINER
THAT FAILED



Rod Mill Liner Wear and Cost Reduced

The use of the big (9½ by 12') Marcy rod mill in the grinding circuit rather than an additional stage of fine crushing has been a marked success at the Yellow Pine operation. The practice was not, however, trouble free in the beginning, and it presented its full share of headaches. Excessive wear after the waves in the liners had worn smooth was one of the major problems. Cause of the condition was obvious when the 55-ton rod charge started slipping on the smoothed surface of the liners but design for preventing this condition presented a serious problem.

The mill, an enlarged version of other Marcy rod mills, is driven by a 450-hp. motor at 16.6 rpm., which does, however, produce a fairly high peripheral speed of approximately 600 bpm. It had, as original equipment, manganese steel liners which had 40 wave or corrugated shaped parallel ribs running lengthwise of the mill.

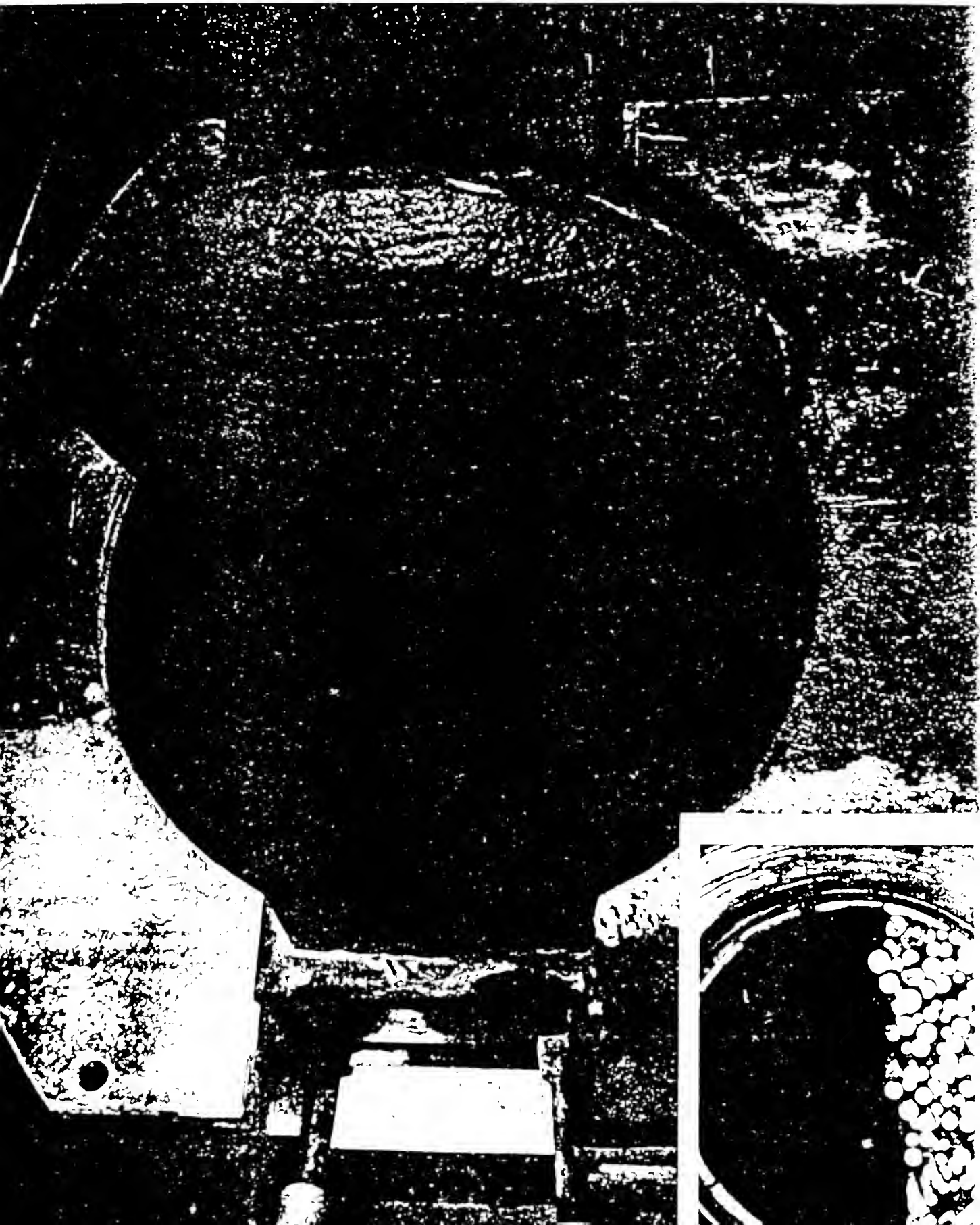
Some 124,000 tons of ore were ground before the ribs were completely worn away, but the remaining 1¾" of smooth plate would grind only an additional 10,000 tons.

The problem was solved by replacing the ribs with steel bars which proved highly satisfactory and reduced liner cost nearly 70 per cent. The method was pioneered at Stibnite under the supervision of Robert Clarkson, mechanical and construction superintendent.

In the first experiment, 20 mild steel, rectangular (1½ by 8") lifter bars were bolted lengthwise of the mill to replace the original waves. Each bar was made up of two 6' sections for easy handling and bolted through with the regular lug bolts. These bars ground 76,000 tons and would have handled 80,000, and there was no measurable wear in the valleys. A new set, soon to be installed, will be 2 by 8" manganese steel bars.

The adoption of this practice resulted in immediate savings. The cost of the mild steel bars was about one-fourth the cost of new liners, and installation costs were also lower. Liner cost, which had averaged 6c per ton, dropped to about 1.6c with the installation of the new lifters.

Mr. Clarkson expects that about two more years of experimental work will be necessary to accumulate complete and accurate data on performance and costs with manganese steel bars, but it is expected that the hard alloy steel will be more satisfactory and less expensive than the material that has been in use.



Clarkson: Yes. Up out of Fresno. The Fresno or the dam job was just about midway between Fresno and O'Neal's, was a little old gold mining town that served quite a farming and cattle ranching area, too.

Swent: Did you move your family down there then?

Clarkson: No. No, they stayed in Brown's Valley because Edna's brother was there, and he was divorced, and he had a son that was just a little bit older than Curt, and so Edna--at that point in time, she had three kids and took care of them. We didn't move the family until the Grand Reef, the Klondyke job in Arizona came along.

Swent: And Edinger got that, too, did he?

Clarkson: No, no. He didn't have anything to do with that. When we finished the Fresno Banner Mine, he ran his shop for a while, his fabricating shop. Well, the memory comes back. The big thing that he had that he was doing in the shop was building tepee burners for sawmills. He got to be an expert in that market. Well, that was outside of my interest, the sawmill work. But that's what he was doing. More sawmill work than mine work. But we separated our interests--well, just discontinued fabrication service, and we settled out our financial interests and continued on separate ways.

And the Grand Reef job in Arizona, I was general manager of the mine.

Swent: How did that come about?

Clarkson: Through American Cyanamid. And also a fellow that got to be a prominent mining man, named Tiny Lynn; earlier he was mine foreman at the Idaho-Maryland when I worked there. He was an acquaintance I always kept in touch with. Harold Lynn. He was a Stanford alumnus. One of his early jobs was the Idaho-Maryland Mine. Through Cyanamid fellows and so forth--I never worked at any other job that he was on, but we always kept in touch. I would find out what Tiny Lynn was doing. If the occasion rose, he would find out what I might be doing.

##

Swent: You said he was working with Kelly Krebs?

Clarkson: Kelly Krebs was a Cyanamid metallurgist. Worked with a lot of the methods used at the Idaho-Maryland. Cyanamid people in that period of time and especially with the Fagergren flotation

machines in the mills--cyanide chemicals as well as flotation reagents--it created a circle of friends on different jobs, for Tiny Lynn as well as--I got to be a part of a circle of friends like that and kept in touch with some.

A Circle of Friends: Frank McQuiston

Swent: I wanted to ask you about a couple of people that you might have known up there in Nevada City and Grass Valley. I know that you knew Frank McQuiston.

Clarkson: Yes. And Jim Curry.¹

Swent: Jim Curry, yes. Would you like to recall any experiences with them?

Clarkson: {I first met Jim Curry at Greenville at the Cherokee Mine when I was still at the Standart Mine at Indian Valley.}

McQuiston had a part in the feeder development. The general superintendent of the Idaho-Maryland mills--there was four different mills, as I recall. When I was introduced to getting people to try my feeder, the Spring Hill Mill was one. But Hal Lewers advised me. He said, "Don't connect it with the Idaho-Maryland." He says, "Do your activity somewhere else," because he thought maybe patent-wise or something there might be some complications. He was just advising. McQuiston was the metallurgist for Newmont at the Empire and the North Star. He had problems because the flotation was still pioneering, especially the old stamp mill gravity concentration and amalgamation, amalgamation plates, and the methods of cyanidation then. They were always looking to improve recovery. So Frank's work was a lot with the flotation, improving their flotation recovery. So he was real happy to try some of the first feeders built by Cyanamid.

Some of the first feeders, if not the first, that Cyanamid built, why, Frank was using them over in the North Star Mill. And finally in the Empire Mill, so we developed a friendship. Then the manager at the Spring Hill Mill was the one I think you have a copy of the letter that suggested to Cyanamid that my feeder was doing a good job for them. So a circle of friends that took an interest--because I was just a pretty young buck out there, getting known in this activity. Therefore grapevine information led to new jobs.

¹See ROHO interviews with Curry and McQuiston.

Same way with Edinger; Edinger knew Tiny Lynn because he had done fabricating jobs like--the first, I think, was building the hangar for McBoyle's airplanes. Ted wasn't very known at that point; he came down from Seattle shipyards, and he was just getting experienced in mine work, too. There's another factor in that. Ted's wife, Mary Edinger, she had two brothers that I knew. One was an M.D., and he was an M.D. for the miner's hospital at Kellogg, Idaho. And her other brother also I got acquainted with because he was a mining engineer, {then in the Grass Valley/Nevada City area. Edinger was involved also in one of the earliest shaft boring machines used at the Idaho-Maryland}.

Swent: What was the name of Mary Edinger's brothers?

Clarkson: Bonebreak. That's quite a name for--

Swent: For a doctor, yes!

Clarkson: Dr. Bonebreak. And the other brother {Dick} was the mining engineer. He was a young graduate, and he was starting in the Grass Valley area. I think he's the one that led Ted into mine work.

Social Life in Grass Valley

Swent: What sort of social life were you involved in around there? Did you belong to any of the clubs?

Clarkson: Not really, then. It was before I joined the Masons. I didn't do that until after I was back at Stibnite.

Swent: Of course, you were working two shifts.

Clarkson: Most of our activity was dinner parties with friends, like in Grass Valley. Then there was quite a lot of activity at the Elks Club in Grass Valley, like card playing. {whist}

Swent: Did you belong to the Elks?

Clarkson: No. No, I never--when I joined the Masons, why, it was a little too much. Of course, I was still out--in that period of time--to pretty remote mine sites.

Swent: But you could go to the Elks Club even if you weren't a member?

Clarkson: Well, in Grass Valley a lot of the activities as well as mine safety training was done at the Elks Club because they had--it was a pretty good-sized hall there. A real popular card game, and I can't say the name of it now, that the Cousin Jacks loved to play. That was card parties that we went to. What the heck's the--you didn't play at just one table; you played until you reached a certain--I've forgotten the game, even. And then the losers would move on to another table.

Swent: There's a game called whist.

Clarkson: No, no. I think it was a game that was Cornish, cousin Jack origin. Whist, whist. That's what it was; now I'm certain.

Swent: I remember hearing about whist when I was growing up.

Clarkson: That was very popular in Grass Valley.

Swent: Who sponsored these parties? Who gave them? Individuals?

Clarkson: Individuals, usually. Or groups. Kind of a club group or whatever. We didn't renew or establish--our short periods and things--we didn't establish any church affiliation in Grass Valley because we were in and out, like to Buckhorn, just too far--and, of course, movies. Movies were very popular. We took in one or two movies a week.

Swent: Drinking?

Clarkson: Well, early days at Stibnite, drinking was--it was a remote mining camp. It was a positive no-no, for drinking. Those few occasional miners that had a drinking--one of the stories, like one miner swiped the vanilla and lemon extract--because they got it in big bottles--out of the cook house, and got drunk. The story kind of leaked out that the manager had his own jug of booze--he liked to have his own drink. But any drinking on the job was a no-no.

And drinking didn't seem--except an individual--didn't seem to be a great thing in the Nevada City, Grass Valley area. Beer. In the middle thirties, beer bars became real popular, where the fellows coming out from jobs stop into the beer bar and have a few beers. Well, we could go--like, an Italian store was on Idaho-Maryland road, had wine in big casks. You would take your own jug and get a quart or a half gallon of wine. But with Edna, we were not much wine drinkers then. You used it for cooking.

And then there was a place in Grass Valley that made the best ever ravioli. It was not a restaurant. They had a little bar where you could go in and have raviolas, but their main business was people would take their kettle and get a kettle of raviolis. We did that. Where we were living on the Idaho-Maryland Road, I had to walk about two blocks. I would take a little kettle and go get our dinner of raviolas every once in a while.

Swent: So when you entertained your friends for dinner parties, what happened?

Clarkson: It usually wound up playing cards. Pinochle was more common than bridge.

Swent: Did you serve drinks?

Clarkson: I don't really remember that--we didn't serve drinks much. The real cocktail parties, we didn't get started much into that until we went back to Stibnite the second time. Then we had dinner parties and cocktail parties. There was more drinking, but still it--then the company built the recreation hall, and that was the first bar that was all a part of the recreation setup. But the nearest bar back in those days was the town of Yellow Pine. That was twelve miles away, down the canyon.

Swent: Well, during the Depression, of course, it was kind of--

Clarkson: Dances. The dances. There was always some drinking around with the dancing.

Swent: Well, I was thinking about Grass Valley.

Clarkson: Grass Valley. When I first went there, we didn't--there was some bars. And the Italian store, family store, sold some wine and so forth. But it was not a big thing.

Swent: No, it wasn't so popular then.

Clarkson: It really wasn't.

Swent: So then your friend, Tiny Lynn, somehow got you down to Arizona.

Clarkson: He knew of this job, and then Kelly Krebs was there, trying to sell some flotation machines because they were talking about remodeling the old mill and things like that, so word came from Tiny Lynn and also from Kelly Krebs and, I think, even Otto Brown gave me the word about the job.

Swent: So then did you write to somebody and ask for the job?

Clarkson: No. I just contacted, I think, first by phone, {the manager of the company}. [Going through papers] Just to give you an-- [shows a letter]

General Superintendent, Fresno Banner Mine

Swent: Let's see. This is the Calistoga Mining and Development Company. I'm looking at a letter here that's from American Cyanamid in Azusa, California. It's from Otto Brown, and he says, "Dear Bob--" Oh, I see. This is when you were at the Fresno Banner. You were general superintendent.

Clarkson: Yes, for the final period. {Just a short time.}

Swent: And you had to develop the mine as well.

Clarkson: Well, Edna's dad was involved in developing the mine. But after getting the mill built and so forth, why, he needed some help to get the whole operation going, so that's--he was actually the general manager. He was getting further along in years, so I stepped in to help him out. But then I went on to the Klondyke--it's on that.

Swent: I see. What it says in this letter is, "You will find the position of general superintendent of Fresno Banner a busy one and the task of developing sufficient ore to keep the mill running constantly a most intriguing proposition....I do look forward to seeing your new mill."

Clarkson: The fact was that they didn't have enough ore developed to keep the mill running, so we--I made the decision that it was best to shut it down until--

Swent: It's hard to know when to do that, I suppose, isn't it?

Clarkson: Yes. Well, that was a hard choice because it had quite an effect on Edna's dad because of his age. He was alone; he was a widower and so forth. He had been quite involved, and the people--they were a Fresno group--they wanted to get a mill built on the job, and they pushed building a mill before the mine was ready for it. With war clouds coming on at that point in time, I couldn't see that they could get the--it was going to take a lot of work to get the mine so it would keep the mill

running, and so I just recommended that they close it down at that point. And I moved on.

Swent: Did it ever open up again?

Clarkson: No. Well, it wasn't long after that until the closing order, the L-208 order. {Some tungsten ore was known in the area and the owners tried to promote the mill for that but never succeeded--finally the equipment was sold off.}

Swent: And then after the war it didn't re-open?

Clarkson: There was no point in--well, they couldn't. They were not allowed to even go ahead to hire--

Swent: I mean later, after the war.

Clarkson: I don't really know what happened to it after the war. I think the mill was probably sold. I didn't ever hear of it--any activity there again. Situations like that occurred quite frequently in California, the Mother Lode country and beyond. That was a nice mine-mill setup but it was small: 50 tons a day. But they didn't develop the ore to the point where they could keep it running. It was virtually all hand labor, mining underground. It wasn't big enough for any real mucking machine work and the like.

[tape interruption]

General Manager, the Grand Reef Mine, Klondyke, Arizona

Swent: All right. We're starting here after lunch now. You were just starting to tell me how you had gotten the job with Calistoga. Where was its headquarters? Was it in Calistoga, California?

Clarkson: No. They had a mine operation at Calistoga, but actually the holding company was a Los Angeles oil company, Graham Loftis Oil Company. They sold the Calistoga operations. That was another venture in mining for the oil company. And they had money from that to invest in another mine. Then they located this old Grand Reef Mine, and so they got an option on the Grand Reef property and were in the process of developing it.

Swent: And this was near the town of Klondyke, Arizona.

Clarkson: Yes. It had a post office.

Swent: In the Tucson area?

Clarkson: No. In Graham County; our nearest business towns were Safford and Wilcox. It was in the area where the historic Fort Grant was, at the head of the Aravaipa Canyon. That valley had a name, but I simply can't recall the name of the valley.

Swent: What were you mining there?

Clarkson: Lead and zinc and some silver, of course. But that was what the production was predicated on. But with drilling and--as the ore body was going down, it was turning to copper, and with depth it would have been a copper producer. But the shaft was down to the 400-foot level and diamond drilling below that level indicated the change to copper.

Swent: And you were the superintendent there?

Clarkson: Yes.

Swent: Of the entire operation?

Clarkson: Yes. Until the company decided--well, the War Production Board, they laid down that we would have to--the company would have to put a new shaft down; they couldn't produce through the existing shaft, and the manager of the Graham Loftis oil company was Mr. Hugh B. Martin. He was also the general manager of their mining interest, so I put together a design and the cost and everything for a new shaft. They decided--the company--

Swent: So this time, then, you moved family and all down to Arizona.

Clarkson: Yes. It was some ranch country there, too. There was cattle ranches--there was no living quarters at the mine. Most of the crew came from the local area, but there was one ranch family that the lady {Mrs. Rutledge} said she would board any workers, single men, and they also gave us a place to stay there until--the company offered to get a trailer house for me to have at the mine. We didn't like the idea of a trailer house in that climate. The heat. It was right up in a very rocky canyon.

So the original manager's house--there was still the shell of it there, and it was sound. I said, Well, I'll have the old house rebuilt, remodeled and so forth, and they said, Sure. We stayed at this ranch place until I got the house rebuilt at the mine, and then we moved up to the mine.

Swent: When was this?

Clarkson: This was in 1940, late 1940. And so I had the family house, my office and everything was right at the mine. But I got a few more dwelling areas fixed up for the mine foreman, and for a mine engineer {John Strohl} that I had. He was the assayer, too. Then I had a good mining camp established. In the course of that, I completely remodeled the mill and added the necessary equipment, crusher and mine ore bin, and other mine facilities that we needed to--and that meant, in that period of time, pumping out down to the 400-foot level the old mine. There was a lot of water generated in the--and then re-sampling and setting up a program for what it would take to re-develop the mine.

Well, there was a big stockpile there of something called chat, that contained enough values to mill.

Swent: What did you do with the water that you pumped out?

Clarkson: We pumped it out by putting in a shaft sinking pumping system, and we had a large reservoir site above the mine and pumped the water into the reservoir, so we then used it for milling because the gulch--the gulch was a sometimes dry stream bed. Most of the time water for the mill had to come out of the mine. That all worked real well.

Swent: In those days, did you need any kinds of permits or anything to do this?

Clarkson: Oh, yes. Then the state mine inspector. The only one that we had to answer to was the state mine inspector. That's for the underground work--and for tailings disposal. We didn't have any other regulatory agents other than the insurance that was current.

##

Swent: We haven't talked about safety at all in the mills and so on.

Clarkson: I'm just going to give you a glimpse of--

Swent: This is a letter from Calistoga Mining and Development Company. Their headquarters were in Los Angeles. Written to you in Klondyke. From Hugh B. Martin. Was he the head of the company?

Clarkson: He was the general manager, CEO, of the company.

Swent: Okay. [reading] "Several times I have prepared a rough estimate of the cost of our proposed new shaft....desirable to

have accurate figures and estimates....At your earliest convenience, please prepare a careful estimate as to labor, material and supplies, time involved, and allocation of overhead with respect to each major item....raising the shaft from the 200-foot level and drifting to the shaft location....Two important factors to keep in mind: The greater the detail, the greater the accuracy and 2) we would like to receive this report as soon as possible." [chuckles] "It's extremely unwise and decidedly out of line to advance any salaries at the mine at this time. Donald has just been the recipient of a \$20 raise."

Clarkson: [chuckles] \$20 in today's jargon.

Swent: I'd like a copy of these letters that we're talking about, and we'll put them in, too. What about money? What sort of salary were you getting?

Clarkson: I think eight hundred and some dollars a month.

Swent: Eight hundred. And, of course, your housing.

Clarkson: Housing, furnished. And all of that.

Swent: Were there insurance and benefits of any kind?

Clarkson: Just insurance, workman's comp[ensation] insurance. The company had benefits.

Swent: What kind of benefits?

Clarkson: Just medical and hospital benefits for the family.

Swent: That would have been in Safford?

Clarkson: That would have been Safford. Safford was the nearest town with such facilities. During that period of time, the big mill building project was going on at Morenci.

Swent: That was Phelps Dodge.

Clarkson: That was Phelps Dodge, some of--the longtime friend that was mill superintendent there in those days was Leo Abel. Did you ever come across Leo? {We had mutual friends in Australia.}

Swent: Yes, I know Leo, yes. Australian, isn't he?

Clarkson: Yes. He had a pretty severe stroke a few years ago.

Swent: I've seen him since then.

Clarkson: I haven't heard recently how he's doing because we kind of lost contact.

I think Jack Knabel was in that period of time. I knew Jack.

Swent: Back just a little bit. At the Standart Mine, Greenville, did you have hospital insurance and medical insurance at that time also?

Clarkson: Yes. Of course, that was local, like in Greenville. The doctor that took care of--then if we needed--someone had a problem at the mine, the doctor would come to the mine.

Swent: The doctor came to you. Was there a hospital there?

Clarkson: He had a clinic and his own small hospital.

Swent: Is that where Curt was born?

Clarkson: That was where Curt was born, was in the clinic hospital section. Dr. Batson. He was the company doctor--he was previously with Red River Lumber Company, the big Westwood Mill. He came out from Tennessee as a young doctor, and he was a company doctor there, at Westwood, and then he started his own clinic in Greenville. All the rest of his medical career. So I learned--he stayed in Greenville until he retired. He was a fine, big Tennessean type of person. If we had any problems at the mine, why, he was usually right there, on short call.

We did have some accidents during the construction period. Once when we called him, why, he came up to check the patient right on the job.

Swent: What were the kinds of things that caused accidents?

Clarkson: Oh, a fall on one occasion. In the frame construction period, an electrician was up on some staging, working. And another worker way up above him dropped a piece of plank, and it came tumbling down and hit this fellow on the shoulder and knocked him off the staging. Broken shoulder resulted from that. Some things like that.

One time we had a fellow that got a hand pretty severely burned. We had an outside furnace, a heating device and vat for heating tar for coating pipe. Somehow the burner kind of

exploded and burned the hand real bad. We took him to the doctor. The doctor didn't come for that.

But in all of that--in all of my construction and operation, I never had a real serious accident. Broken bones. One case of a fellow--this was at Stibnite--losing an eye, a welder. But they were pretty far and few between.

Swent: What sort of arrangement--again going back to the Klondyke, the mine at Klondyke. Did you sign any sort of paper, agreement, or did you just do everything by word of mouth when you were employed?

Clarkson: {They usually provided a written summary of the work to be done and a time table.} They made a formal offer, and I accepted it. But then a handshake was predominant. It indicated what you could do and what they wanted done, and you made your promises. But you take on the prior problems that existed and all of that.

Swent: And if you didn't perform, you could have been fired at any moment?

Clarkson: Yes, oh, yes. I never left a job except with real good feelings and contacts after the job, like this fellow, Gus Johnson, that was manager at--he had been manager for the company, the Indian Valley Mining Company. It was a mining company owned by an Alaska fur-trading company based in Seattle, and he had operated mines for them in Alaska, in Washington--the Mercury Mine in Washington--and then from there he came on down to Greenville because as well as fur trading with a ship, the Seattle company had--their basic business was fur, Alaskan fur trading. But they were also like the Calistoga company--involved in mining.

But anyway, like that little article, he went to San Francisco. Went to work for a San Francisco company {Geo. M. Philpott Co.} during the war years. Well, our friendship continued until the time he died. They moved--when he retired, they lived in Woodside. I helped--at that point in time, he was in his second marriage. The first wife {Patsy} we knew at Greenville at that period of time. After they moved to San Francisco, his first wife died there, and then he remarried a lady that worked for the company that both worked for there. We helped them both, right until they passed away. They actually lived in Woodside, just a little ways out of Woodside Village. They had a real nice little place up there, {called Puddle Acres}.

Swent: Not far from you.

Clarkson: Not far from us. Like Klondyke. For a long time after we finished that job, I also kept in touch with the principals of the company. But I never left a single one of those jobs as a canned person. That's something I'm proud of.

Swent: Obviously, you've been very conscientious about keeping up your friendships all through the years.

Clarkson: Well, of course, there were shutdowns for a reason. But I never left a one of those jobs under stress. I didn't leave it--taking into consideration the conditions--I didn't leave any with ill feelings.

Swent: That's wonderful. You were down in Klondyke installing new equipment. Was there a mill there already that you were upgrading?

Clarkson: There was a mill there already. The fellow that had the same job that I took was canned [chuckles]. I replaced a fellow that was canned. {So I had to perform!}

I might mention this: an interesting thing--I found a lot of old records on the mine there, which I turned over to the Arizona Historical Archives. What I found out about it was that the mining property was in the estate of John Mackay. The actual estate, what the Calistoga Mining Company was dealing with, was the Irving Berlin estate. Irving Berlin's wife was John Mackay's granddaughter. Dug up a lot of interesting stuff about the earlier operation.

The mine hadn't been operated since World War I. It was a major producer of lead and zinc during World War I, and then it was closed down. The mine filled with water, and then when the Calistoga people located it, they thought there was a good opportunity there to pump the mine out. The old mill had been pretty well maintained; that is, the buildings were still in fairly good shape. And some of the machinery, even the power generator, an old diesel {Cooper-Bessemer} generator, was still operable after repairs.

Apparently, those periods when they made some attempts to do a little work there, there was several thousand tons stockpiled of what was called "chat." It was crushed and screened material. Apparently it had been put through a gravity jigging process, but they couldn't do anything with that fraction of the ore at the time. When I finished the mill remodeling, why, we milled all of that chat and made a little

money from it. Ore that had already been mined, of course. So it was just the milling expense. And then the concentrate shipped down to the smelter in El Paso. It was two or three carloads that we got out from that.

Swent: What did you need to do at the mill, then, to upgrade it?

Clarkson: Well, renovated mostly with second-hand machinery. Even some-- Edinger jig--and new machinery was flotation equipment-- Fagergren flotation machines. The thickener for the concentrates and the filter for the concentrates, that was second-hand machinery. Then taking the old diesel engine apart for overhaul, taking parts into a machine shop in Safford and then practically rebuilding it for the power source. A Cooper-Bessemer "hothead" single cylinder diesel engine. Quite a few of them were used in the Gila Valley to power cotton gins. The Gila Valley was a big cotton-producing area in the Safford area in that time, and I found that there were quite a few of these Cooper-Bessemer engines still in use, so it was repairable.

Swent: You were there at the time of Pearl Harbor, you said.

Clarkson: Yes. We didn't have a house radio, but we listened to the Pearl Harbor news on our car radio. Edna and I would take turns doing that and then report to each other. And for some of the workers.

Mexican Workers

Clarkson: I had almost an entire Mexican crew. It was the first time I had ever worked with Mexicans. But they were all native, two or three generations, mostly from down in the Aravaipa Canyon.

Swent: So they spoke English?

Clarkson: Not all of them. Some of them were illiterate. They just hadn't acquired an education. So remote in the canyon, I guess, but some of them were very good, too. After I got onto their work habits, I really enjoyed having them.

Swent: Were they different from other workers?

Clarkson: Well, their habits were different than what I had been used to. If they decided to take a day off, they didn't ever ask or tell you, and such as that. If you reprimanded them for not showing

up yesterday, it hurt their feelings. [chuckles] Because it was their custom, and they thought that I should accept it.

But my mine foreman was an Irishman. He had lived in Mexico a lot of his working years. He had a Mexican wife. Interesting. They had two little kids; the little girl was just about a teenager. She was very sharp. She spoke English fluently. But her mother didn't speak English. She loved to come over and take care of--Edna had her--quite often help her. She wasn't quite old enough to be a babysitter, but she was pretty mischievous, too. One of the things that she loved was that--we had bathroom facilities, and she loved to take a bath in the bathtub. But she was a good kid.

But her mischievousness was with her mother because her mother only spoke Spanish. We would find out sometimes that when she interpreted, she didn't always tell her mother the same story as she had been told or something a bit different than fact about our household. It was nothing that was serious. It was amusing.

But we did have one Mexican fellow that was a roustabout. He was a wetback. He was the only one that I had there that was not a U.S. citizen. He was illegal. He didn't--but he didn't get into any trouble with that, and I didn't either. I gave him materials, and he fixed up a place to live with his family, right at the mine. He was very productive and took good care of his family. He had an old beat-up Model A Ford pickup for transportation. They had a donkey--a burro--and a milk goat. The milk goat took care of the three little children that they had. We helped them out by giving them things--food things. Edna liked the little children.

But then he also trapped animals. Besides working on the job, he trapped coyotes and some foxes, and he took the pelts off them. Well, he got a little pocket money from that. Some of the time, when I had to shut down on some of the work and I laid him off, well, he was right out, either hunting or doing something to get food for his family. Well, on one occasion there was a ranch place between Klondyke and Safford out in the desert area that had pigs. I came along one time on a trip to Safford, and he was loading a pig into his Ford pickup. He couldn't speak but very little English, but I got through that he had found this pig. It had gotten away. So I helped him get it back into his Ford--it was just a small, half-grown pig. And we got it tied in.

Well, the next day, the sheriff came out to the mine after Ramon Epolito. He had stolen a pig from the ranch. They took

him back to Safford and put him in jail. The family had to be taken care of, so I followed in the next day or two and I talked them into letting him out of jail because he had a family out there to take care of. So they made me responsible for him and to legalize him to stay. He had to pay for the pig. Also his wife was pregnant at the time--and the baby was born there, one of the ladies, a Mexican lady came up from down around Klondyke and took care of the mother and baby--midwife type.

But then the baby got pneumonia. Edna tried to help out with medicines that she had, but the last trip down there, she found that the baby was dying. The baby was still--we got him ready and one of the Mexican fellows that worked for me at the mine took them into Safford to try to save the baby. The baby died while they were there. They brought it back. But instead of going to a doctor, we learned they insisted on going to a priest first, to have the baby blessed. Sadly the baby died whilst there. So then a fellow that did timber work and carpenter work, a fellow that had worked for me in Nevada and California--a bachelor--he made a--built a box for the baby, and they took it down to the Mexican--there was a Mexican cemetery down in the canyon, and they buried the baby there.

To begin with, it was a perfectly normal baby, but then apparently pneumonia--it didn't have any medical attention. But the other three children--the older ones were healthy and lively kids. All of that was some of my first experience with Mexican workers.

Swent: What sort of wages were they paid?

Clarkson: Oh, I don't remember now. I think the wages were \$6, \$7 a shift for mine workers and mill workers.

Swent: All right. Epolito--how much money would he have been paid, for instance?

Clarkson: He was just a roustabout worker. He wasn't a skilled worker. It's probably in the \$5, \$6 a day range. See, this was all pre-World War II and wages hadn't started coming up--hourly wages.

Swent: Did your workers have any kind of medical benefits?

Clarkson: Just the normal medical--had to send them into Safford for any kind of treatment, things like that.

Swent: But the company would pay for it?

Clarkson: Well, the company carried so-called workers compensation insurance, which was medical.

Swent: Were the families covered?

Clarkson: No, no. Not unless--there was some arrangement for families, but not very much then. They were mostly on their own. Like for the birth of a baby or an operation. But then medical costs then were still--then it was pretty rudimentary, the same as it had long been, like for appendicitis or tonsils.

Swent: Did you have to provide a school of any kind?

Clarkson: There was a school at Klondyke, but no busing. There was a little community church there too. Went down to it for Sunday school and activity like that. But the Mexicans were all dominated by Catholic priests that showed up there once in a while.

In that area there were lots of Mormons. In fact, the Sunday school down at--that they had--Edna sometimes took the kids to--was mostly Mormon. But, still, it was community. It was not just entirely Mormon. But, as I say, Safford was a very strong Mormon area. Most of the business people that we did business with in Safford were all Mormon.

There was one fellow that had a clothing store that I often went to, there, for work clothes and such. I got to know him pretty well, kind of on a friendship basis. They called him a Mormon Jew [chuckles]. He was really Jewish, but they tacked the Mormon part on.

"Very Little or No Union Influence"

Swent: Did you ever have any union dealings in any of these places? Was there ever any attempt to unionize the workers?

Clarkson: No. I never--the smaller jobs--there was very little or no union influence.

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Clarkson: The Bradley mines, too, all under the Bradley name, the Bradley Mining Company, were all non-union. Bunker Hill, however, all the Coeur d'Alene district in north Idaho, was unionized. Bunker Hill was unionized. Mines like some that the Bradleys

were involved in, but Bradleys always stayed above union organizers. People that worked for Bradleys just didn't go for union.

This is backing up. When I was at Buckhorn, that was a non-union operation, but they told a story, some of the old-timers, about the early days of the operation, I guess when it was a George Wingfield operation, that a union {IWW} organizer walked all the way in to try to unionize the workers, and they gave him a square meal and turned him around and headed him--he had to walk clear back over the mountain to Beowawe Valley to get out of there. That was in the IWW days, the International Workers of the World, so that went back probably about to World War I period.

I never really got involved--it started happening in the Grass Valley area in the thirties. We had friends turn against friends there, working for Newmont. Those mines were all non-union in the early thirties. Then they did get some organized union activity there in the later thirties. Of course, then the shut-down of the gold mines changed a lot of that, too.

Fortunately, I never had to be even involved in any--I didn't like union myself, and the mines in southern Idaho, the Boise Basin district--the IWW had their main strength in north Idaho, in the Coeur d'Alene district. But it never spread to southern Idaho mines.

Swent: That Safford area, though--

Clarkson: And in your young years at Homestake, what was the union?

Swent: Well, they were non-union all the years that I was growing up. They had had some union activity prior to 1912.

Clarkson: Yes. That was IWW.

Swent: That period of the Wobblies. There was some activity then. Mother Jones was there at one point. But from 1912 on until, oh, until the 1960s, I think is when they were finally unionized. But this Safford area in Arizona has been the center of a lot of activity.

Clarkson: Yes, but in later years.

Swent: Not when you were there.

Clarkson: No. I think there was Phelps Dodge. They had unionization, but there wasn't any serious activity, serious strikes that I knew of--the big copper mines.

Swent: How many employees did you have at Grand Reef?

Clarkson: I think at one time we had about forty employees, was the peak of it.

Swent: How often did you pay?

Clarkson: Twice a month.

Swent: Did you have any concern over getting payroll--how did you pay them?

Clarkson: Payroll was made up in Los Angeles. Of course, I sent it in. Checks were made, and then the checks sent back to the mine.

Swent: They were paid by check.

Clarkson: They were paid by check, right. They had then--every worker had to sign for his pay. That was set up in that period of time. Quite a few of the Mexican workers--they just signed with an "X" and I got to know the ones that were illiterate and the ones that had better education. As I said, some, even third generation they couldn't speak English, but they were a few of the ones that were illiterate.

Prospector Jose Rabaul

Clarkson: There was one fellow there, well-known Mexican. He was a well-known prospector. He was a second or third generation. He was a very intelligent fellow, probably educated through eighth grade. I used to call on him to get information about the area of the property and look at some of the other old workings. The property was a pretty--I don't even remember the number of claims, but it was a pretty large holding. But this fellow's name was Jose Rabaul. He would find high-grade lead-zinc surface outcroppings. For years he made a living doing that, packing the high-grade ore out on burros. He was a real colorful person. Called him Joe. He was Joe Rabaul. He lived in an old, old adobe house down at the foot of the Grand Reef canyon. He had had quite a family, but the family was all scattered out.

Swent: Was it legal for him to take this high grade?

Clarkson: He located--it was high-grade ore, but he wasn't--

Swent: He wasn't stealing it.

Clarkson: No. He was a legitimate prospector and miner. He would locate a claim, all hand work. He was a good practical geologist. It was just natural for him to know the country and where he might find a good outcropping he could mine from.

The First Hard Hats and Electric Cap Lamps

Swent: What sort of clothes did the miners wear?

Clarkson: Men were just starting to wear hardhats. I think it was at Klondyke the first hardhat that I owned, like the one that's in the cabinet downstairs. Fiberglass.

Swent: Dark brown?

Clarkson: Dark brown, with the cap lamps. At Klondyke, that was the first time, too, that I had electric cap lamps on the job. That was an advancement in our methods.

Swent: What sort of shoes did you wear?

Clarkson: Hard-toed shoes were in use then. A lot of men--

Swent: Boots?

Clarkson: The fellows working down in the wet areas, pumping out the mine, wore hard-toed rubber boots. But I think it was in the late twenties that hard-toed, that the steel-capped toes came into use. I think that came into being in our safety training in Grass Valley. They held the safety meetings that were sponsored by the insurance company, and the Mine Safety Appliance Corporation. Hard-toed shoes were introduced. We had hard-toed shoes and boots earlier, but not the steel caps. They were just a hard fiber that was in with the leather or the rubber. And other safety methods like that.

Swent: What kind of explosive were you using?

Clarkson: It was all dynamite; I didn't know of other explosives being used in that period. Some black powder was being used still

for some surface work, and then picric acid was another. But the picric acid was mostly used on road or highway construction--surface blasting, rather than--I never knew of it being used underground, nor black powder underground.

Swent: You were using just straight dynamite.

Clarkson: Yes. With different speeds. Forty percent and 60 percent, depending on the type of rock we were breaking. At Stibnite in later years, in the open pit, the first open pit there, I suppose some of the copper mines had access to that. We started using surplus TNT from the war effort, TNT by the carload. Then ammo-phos came along, the ammonia phosphate, which is the big thing today--{fertilizer!}.

Swent: What about drinking? Was this a concern with the employees at Grand Reef?

Clarkson: Hadn't even thought about any--we didn't have any drinking problem. The Mexicans some; but occasionally someone we knew had been out the night before came on showing the effects of drinking. But it wasn't until later years that I really got involved with men that had habitual drinking problems. But in earlier days, my kid days, in the Boise Basin, the mines--why, drinking was a real problem. The Irish were pretty good drinkers. But it was mostly--occasionally a family man that was an alcoholic. Booze fighter, they called them then.

And then through the moonshine Prohibition days, the Boise Basin area, that was mining and logging. Moonshine was a big problem because single men and family men that didn't have their families there with them. The family lived on a farm or down in the valley. Actually, the men on the job were both married men and single men, bachelors, but the married men away from their families. I had quite a lot of experience in later years with good workers that we got them sent to a sanitarium in Seattle, Shadels, to take the cure. Fellows that had taken it were always ready to try to help others. But there was always in some way an individual, a good skilled worker, usually, that had a drinking problem to deal with.

At Buckhorn we did have a saloon and a card room right below the camp. The company didn't. There was the freedom of an individual operating there in one of the old buildings, so there was some problem with that with a fellow that was drinking too much, and playing poker too.

We had one experience there. This fellow--I first knew him in Idaho on a mining job, a Swede. In Buckhorn he was office

manager, the bookkeeper. He had a wife, but she lived in San Francisco. When he was out on a mining job, she didn't come along with him. But on this occasion there was a fellow that had a wife. I think they had one or two children. They were Texans. I remember her red hair. Anyway, this guy accused Andy of making passes at his wife. One morning he came into the office and he threatened Andy, threatened him with a six-shooter.

One of the other fellows got the six-shooter away from the guy and some fellows from the mine took the powder, a few boxes of dynamite out of the powder magazine and walked this fellow over in the powder magazine and put a couple of guards there till they called the sheriff. It took the sheriff several hours to get there from Elko [chuckles]. The sheriff took him into Elko. That left his family there at the mine, but the family was taken care of.

Finally he got out of jail with bail or something and came back and picked up his family, and he was told to leave the camp because he was a belligerent type. Whether there was grounds for him--I think some of the fellows had been teasing him. The actual story. And they just told him that Andy was paying attention to his wife. I don't think Andy had done that at all. I'm pretty sure. But we had little incidents occasionally that sometimes stemmed from drinking.

Swent: I wondered whether you ever had any incidents where wives wanted to pick up their husband's paycheck to keep them from wasting it.

Clarkson: Well, that was--over all the years, when paychecks came into use, there was usually some that picked up their husband's checks. We had that problem in later years in Stibnite. The first years, that wasn't a problem because Yellow Pine was twelve or fifteen miles away, and that was the nearest drinking place (watering hole). But in later years, why, that was what stemmed from the recreation hall, a bar was there too. As usual a few fellows started frequenting the bar too much.

It was a problem in north Idaho and Kellogg and Wallace. I oftentimes made trips up there on behalf of the company and would spend a few days and nights, and sometimes go to the clubs in Kellogg. Too, one of our fellows at Stibnite, a real good friend because we were young people together--maybe I've told you some of this before. He wanted to get into law enforcement, and so he finally got started as a state highway patrol officer. Then he got assigned from southern Idaho to north Idaho, in Wallace. When I would make a trip up there, I

would usually look him up for a visit. And he would tell about some of this--Wallace was a pretty wide-open--more so than Kellogg. Had a red-light district and all that goes with it.

He then advanced through his law enforcement career to become the Idaho state warden of the prison. He was warden until retirement. He served twenty-two years--the longest of any previous state warden. He pioneered a number of prison reforms while he was there--his objective was to educate prisoners serving time in prison but also make them work. The prison had a prison farm with a few trustees, but he expanded on that to the point that the prison farming was supplying enough foodstuff--beef and dairy products and poultry products --to take care of other state correctional institutions. He claimed to have the lowest request to the legislature each year for prison funds of any prison in the country. Also a clothes factory and then license making, making the state license plates and road signs and all of that. But his whole claim to fame was making prisoners work and, at the same time, educating them so they could do something useful when they were out of prison. Rules were tough and escapes few.

Swent: What was his name?

Clarkson: Lou Clapp, Louis Clapp. Soon after his retirement, he and his wife--we were living in Palo Alto then--were returning from a vacation trip, to Hawaii. I think it was their first such trip, and we were just going to have a visit after they were up visiting the wine country, but he had a heart attack and died. Unfortunately that ended his career--he was still relatively young when that happened--early sixties.

Bats and Boars in Old Mines

Swent: Is there anything else that we need to say about the Grand Reef Mine?

Clarkson: Oh, it was very interesting. I'll tell one other story. It was full of bats. There's a lot about bat preservation now, but in the old working--see, in the reef, a towering outcropping where it got its name, the Grand Reef. It was a brecciated reef--it was about 150 to 250 feet wide--crossing the canyon. Being so much harder, the host rock, the wall rock, eroded away from it as the canyon cut its course through it and left the reef projected way up above the adjoining surface. The reef was highly mineralized and the ore shoot in

the reef, the high-grade ore. They mined it clear through to the surface.

This left an open chimney clear through to the surface 150 feet or so above the adit. It was a huge chimney. The adit tunnel at streambed level went into the shaft collar. The shaft collar was underground, say, a couple of hundred feet, accessed by the tunnel. That created a natural draft up through the chimney to the surface.

Then there was a long drift into the hanging wall, 300 and some-odd feet. That drift was not a production opening but an exploratory drift, and it was full of bats. The bats would go out and up through the chimney. In the evening, why, it just looked like a cloud of bats coming out. They didn't bother us any because we were not working through that side tunnel. But I used to walk back in there once in a while, and the roof of the tunnel would be just literally covered with bats. I'd turn my light on them, and they would squeak and wiggle their wings and so forth. And, of course, the floor of the tunnel was covered with guano--quite a sight.

Swent: I can imagine the smell.

Clarkson: Well, it really wasn't all that bad because in the dry Arizona climate it dried out so fast. And as I said, there was good ventilation in there. But it was an interesting feature.

Then the other element that we had to look out for there was the *javelines* [native pigs] because some of the old mine workings on the property--they kept gates on them, but sometimes the gates would get left open, and *javelines* love to be in places like that. I had one encounter in one of the old tunnels with a boar and two sows. I was showing one of the company men that came out from Los Angeles, a geologist--I took him over the ridge to show him some other old workings on the property.

I noticed that the gate was swinging open, but we went on in, anyway. Of course we had our lights and all--probably a prospectors pick. I had explored it before and was familiar with it. But we got in there a ways, and I heard sounds. I immediately recognized them. I said, "We better get out of here, get out of the way." Well, it happened to be a place where there had been a little stoping done that you could climb up above the floor of the tunnel. I said, "We better get up there." We just got up there, and the little boar came woof-woofing out [chuckles]. He was really on guard. He didn't encounter anything, and then he came back in, so we just waited

until it got quiet, and then I said, "We better sneak out of here quickly."

He left the next day, and later on I went back and they were in there yet. I killed the boar. I gave the boar to this Epolito, the Mexican fellow. He loved to get that to feed his family. So that was fine. The two little sows--they got away. I let them get away. So that was another story.

Swent: That's something you don't expect to have in a mine, really.

Clarkson: There's lots of them in that area. Also there was excellent deer hunting in there. I got my deer while I was there. We could get--Edna and I both always loved to ride. We got good horses from the ranch where we stayed. We took a horseback trip back on the mountain and also obtained the horses to go deer hunting--white fantails.

Extracurricular Activities; Making Fun Out of Anything

Swent: It sounded like a good time down there.

Clarkson: Well, it was extracurricular activities like that, and the people--if we have time for another story--

Swent: Sure.

Clarkson: A young mining engineer that I had that made the reports and surveying, also some of the assaying, he had a young bride. They were a great couple, John Strohl was his name, John and Willa Strohl. When we shut down there, he got another job back in New York, North Creek, and so they moved back--they had their family, after that. They didn't have any children yet at Klondyke, but she wanted to have Thanksgiving dinner for a couple of the bachelors that had worked for me on other jobs. They were guys that could do something of everything. But she wanted to have Thanksgiving dinner and have these fellows and another family or two. And so Edna checked on her because she was a young bride, and she assured Edna that she had everything on hand and ready, including the turkey. They were living in one of the places down by Klondyke, one of the old--an adobe house, but pretty nice.

And so Edna went down a bit early to see if she could help. Though she had the turkey, she hadn't picked the pinfeathers; she hadn't done--and it was coming up to time for people to

start coming. That threw Edna into a tizzy, and she jumped into it. She said, "Why, Willa, this turkey has to cook yet, almost all afternoon." Here it wasn't even prepared for the oven yet. So Edna pitched in, and some of the others that came helped.

One of these fellows, one of the old bachelors, he pitched in to help, too. So it was just about midnight that we had Thanksgiving dinner. It was a big joke. But she learned quite a lesson--{a lot of fun, actually}.

Swent: That was one Thanksgiving you won't forget.

Clarkson: She had never had experience like that. Her family had lived in Cuba, on a plantation, and everything had been done by servants, I guess. So she still wasn't quite up to being a miner's wife [laughter]. {She eventually became a great mother--had three boys.}

The Indian Valley and other--when we were there long enough, a fun thing happened and we made fun out of it.

Swent: Yes, you have a lot of fun in those places.

Clarkson: In earlier days, courtship and so forth, the Saturday night dance was the big thing. That's where you got your date, your girlfriend and so forth. That's the way young people got together.

The Grand Reef Closes Down

Swent: Did you close the mine down, then, in Arizona?

Clarkson: Yes, because--I started to tell it before. The cost of a new shaft and then it was up to the point in time with the War Production Board. They wouldn't approve of any war production contract without a new shaft, and then regulatory--the state mine inspector would--we could do all the development work and that through the existing shaft and haulage tunnel, but they wouldn't let us go into production because--I told you about the bats. This high chimney that had been mined out, that was right over the shaft collar. If there was any rock cave from above, that could be very dangerous.

Well, the first thing I initiated was building a very substantial bulkhead over the collar, and the state mine

inspector approved of the design and everything, so if there was any rock fall from that chimney above, why, it would be deflected off, so it supposedly eliminated the entire hazard of fellows, workers, being underneath a cave like that. So that enabled us to go ahead with the pumping, clean out the old workings, and do some re-timbering in the shaft, and all that kind of preparation work.

But there were those huge caverns where the high-grade ore had been worked out in the lower levels. Without any timbering. So all of those places had to be very carefully evaluated, with some pretty substantial costs connected with doing it, to do so in an acceptable and safe manner. So that--my forte and my interest with the surface equipment, the milling and so forth, but I still kept getting this opportunity for underground work, too, so I had some experience and also enjoyed it.

Of course, my first experience in the Boise Basin was working underground in a gold mine. My first work with Bradleys at Stibnite was underground until the mills, so my interest in underground work was always--I liked it and was interested enough in it, so maybe a mechanical point of view was helpful in that, too, because the pumping, the pumping operations, and the hoisting. That all fit into my mechanical interests real well.

Swent: How did you come to leave Grand Reef?

Clarkson: As I say, it wasn't approved, and the company elected not to appropriate any more money to sink a new shaft to meet the requirements. We didn't have all the permitting that an operation like that would have to wade through today, but still we had--at Grand Reef, we had the ranches and farms down below, so we knew to get along with the farmers, we couldn't let any tailings go down the stream.

Then tonnages were just peanuts compared to the tonnages copper mills and the gold mills produce from the open pit mines today.

Swent: What was your production there?

Clarkson: Well, there was never any established. In setting up the whole mill plan, I designed I think for 150, 200 tons a day, because on the economic feasibility of it, that's what the mine had to produce to be a feasible operation.

Swent: But you never actually operated the mill.

Clarkson: Oh, yes.

Swent: You said you worked that stockpile of chat.

Clarkson: The big stockpile of chat, made a little money.

Swent: But from the mine you didn't.

Clarkson: That paid for remodeling the mill, some things like that.

Swent: I see. But the mine itself you never put back--

Clarkson: The mine never produced. We didn't even--we couldn't take out even any shipping ore. There was a little shipping grade ore, but it was right in the area of those big stope areas that had been mined out earlier, so it wasn't safe to even try to tackle it. The miners and the state mine inspector and my own experience--a lot of that was a matter of judgment, what you could do and what you couldn't do safely--judgment or experience.

Mechanical and Construction Superintendent, Stibnite, 1942

Swent: So did you approach Bradleys then, asking to go back to Stibnite?

Clarkson: No, no. Again, that was where Otto Brown came on the picture again. He was--and they were struggling with the metallurgy of the tungsten, the scheelite and the complex ore of antimony and gold. Otto was one of the metallurgists called in (Cyanamid). My dad was working at Stibnite as a millwright and carpenter. He was in his older years. When he had retired from the ranch, but he still liked to work. My brother, my older brother, took over the ranch operation.

We were still working at Klondyke, but it was pretty much shut down then, waiting for things to happen with the decisions of the War Production Board and the company. So we took a vacation to visit Stibnite and visited my folks. Lo and behold, Otto Brown was there. Jack Bradley was there. They were going over the problems. The way that I ran into Otto in the course of his work, he said, "You need Bob Clarkson here." And Jack Bradley and the manager, Harold Bailey, they sent word that they wanted to talk to me, and so that was arranged. {I had worked with Bailey at Stibnite in earlier years--he never

left there. I had met Bradley while in Grass Valley--he was then at their Spanish mine.)

I could sense the picture at Klondyke, so I told them my situation there, that I was manager of the mine and I had obligations. I said I would let them know. So after our vacation time, we went back to Klondyke, and I called Hugh Martin in Los Angeles. I asked him a lot of questions. That was when I was told they lost approval of the War Production Board. So I didn't tell him of the opportunity, but then we thought about it, and so I decided to hand in my resignation from the job, because I had laid off most of the crew, just waiting.

Then I, in turn, accepted the job at Stibnite. We gathered up our belongings there, came back to California and gathered up belongings there, and shipped some things and I bought a trailer, a box trailer, in Sacramento, and we headed back for Stibnite. That was in September of 1942.

Swent: How much were you paid? Do you remember?

Clarkson: Oh, my starting salary then--the house furnished and the vehicle furnished--I think \$800 or \$900 a month. It was clear salary.

Swent: Pretty good then.

Clarkson: Yes.

Swent: What was the title of your job?

Clarkson: Mechanical and construction superintendent. In the course of that ten years, sometimes I was the acting mill superintendent, but I always retained--it was because--at the time I went back, 1942, Bob Baker, the fellow that I mentioned in Grass Valley--he was mill superintendent. He had been transferred from the Spanish Mine up there. He really welcomed me aboard because he was having real problems with it. And then we had our consultant, a mill consultant, from Kellogg that had been the mill superintendent at Kellogg. He had reached retirement age. I replaced him, too.

And then later Bob had set up a leaching operation for the company, leaching scheelite in Boise. Built a plant there in Boise. So Bob was sent out to run that. I also had the responsibility of supervising the mill operation, as well as construction maintenance and the like. But I was always

anxious for someone else to take on that part of it because it involved an awful lot of time and attention.

Gaining Experience as an Aeroplane Pilot

Swent: We haven't mentioned your flying. Were you continuing to do any flying through these years?

Clarkson: I was an on-the-job company pilot at Stibnite--(after World War II).

Swent: Right, but while you were in Grass Valley?

Clarkson: Prior to that, Grass Valley, I was only taking more lessons.

Swent: In Grass Valley?

Clarkson: In Grass Valley. Because the owner of the Idaho-Maryland, Errol McBoyle, that owned the Idaho-Maryland operations, also had his private company plane and crew, and so it was an opportunity to advance my flying. I'd just go up to the company airport, and one of the--well, both of the pilots--one of the pilots owned his own plane, and so with his instruction and the opportunity, I built up time in his plane. But when I was out in Nevada and all these little jobs, when ever I'd have an opportunity to get in a few hours of time, I'd do it. But always paid for that. There was no opportunity to tie it to the job, or--being useful for the job--but I kept up my proficiency and kept my license valid.

We moved back to Stibnite, then Bradleys were making lots of use of airplanes, flying back and forth to San Francisco and to Kellogg and then later there was the Ima Mine in eastern Idaho, and they also still had Nevada property at McDermitt, Nevada. So that was when I started really making use of it.

Swent: When did you actually get your license?

Clarkson: Well, my student license I got in 1930, the year that we were married.

Swent: In Boise.

Clarkson: In Boise. And then, going to Grass Valley, worked for the Idaho-Maryland. I was able to get what was called a limited commercial license. That just permitted you to fly out certain

distances, not fly commercially. Like, I could take up a passenger so take up a--actually, that's what it amounted to. I could legally take up a passenger with me around the area. {Later on a private license permitted more usefulness.}

Then, when we went back to Stibnite, then I got my license upgraded. But I still always kept it as a private pilot's license, rather than a commercial rating.

Swent: Did you ever get your own plane, then, in Stibnite?

Clarkson: I had my own fun plane. My own fun plane, but I used it a lot for company activity. A Piper model called a J-3 Cub. It was a very popular primary training plane for World War II pilots, but it was a good utility plane, too. Two-place--I don't think I have a picture of it here. I have a replica of it at home. But anyway, I bought it from one of the old, back-country commercial pilots, Johnson Flying Service. They had used it for carrying mail into the back country. It was a well-equipped and well-taken-care-of plane. I also got skis with it, for wintertime flying, on the snow. I had it the last few years that we were at Stibnite.

When I started the company, I sold it. I probably should have kept it, but my time was well taken up with what I was doing, so I had to give up something. But it was a nice little airplane. For company use, would take it out to patrol a power line and do aerial photography work, and then, too, in that same period, I had the company plane, different company planes that I used, depending on what the need--because we shuttled back and forth between the Ima Mine and the California mines a lot.

Swent: And you were a good long ways from town up there, too. Wasn't it 120 miles to your nearest loading port?

Clarkson: A hundred miles, air miles.

Swent: From Boise?

Clarkson: Yes. But Stibnite was a pretty remote area, in the Salmon River mountains. But then we had to cross all of these mountains or go clear around to get to the Ima Mine--it was a tungsten mine--in eastern Idaho, Patterson, east of Challis. And then we had lots of activity with Bunker Hill at Kellogg. That was a long, tedious drive, up and down the only highway, to get to north Idaho. And then Stibnite, the company developed means of operating the mine without any lost time the year round, in a very heavy snowbelt area. So air

transportation was very important in carrying on all of those activities.

The Important Discovery of Scheelite, Critical to the War Effort

Swent: At the time you went there, they were mining the scheelite, were they?

Clarkson: That's when scheelite was discovered. That's why I went. The U.S. Bureau of Mines had a drilling crew. This was War Production Board stuff. Drilling to expand the antimony because it was a known antimony producer, the largest antimony producer in the country. But they needed to develop more of it; what had been developed and mined was being worked out and limited and so forth. In the course of searching for more antimony, the tungsten was discovered. No one had even thought about, apparently--the way the story goes--that there was tungsten in there. It turned out to be the richest tungsten mine in the country. (The U.S.B.M. drilling crew was headed by a fellow named Don White and he is credited with the discovery.)

But it was unique in its association with the antimony and the gold because it started primarily as a gold mine. The antimony was a byproduct. In the early days of the mine, a nuisance, a headache because it had limited market and it had--some of it had to be shipped to Belgium for refining, and then there was an antimony smelting operation that handled antimony in Texas. And so that was how the tungsten came about, and it was the largest producer of tungsten in the U.S. during that period.

Then the company acquired the Ima Mine that also was a tungsten producer. That was not scheelite. It had to be processed; {went to Wah Chang}. Wolframite was the tungsten mineral there. And a lot of the low-grade concentrates, scheelite concentrates from Stibnite, were trucked clear down to Bishop, California, to U.S. Vanadium, because they had the refining facilities for--of course, that was also a tungsten mine.

And then other tungsten was discovered here in Nevada that was produced during the war years. But still, Stibnite--Bradleys still remained the largest.

Swent: And it was extremely critical at that point during the war, wasn't it?

Clarkson: In later years--well, the early years, K.C. Lee, the Wah Chang Trading Company--they were the principal source of Chinese tungsten for the government. And then Bradleys had contracts with--in later years--with Wah Chang Trading. They refined and also contracted. They were marketers of the tungsten.

Swent: Was there ever any question of your being drafted?

Clarkson: Yes. I was--but every time it came up, the work that I was doing, why, I was turned down or deferred. I guess you'd call it deferred.

Swent: Because you were in a critical job.

Clarkson: Yes. We worked very short-handed at Stibnite because of the draft and armament production industries.

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Clarkson: They were on the company's back to meet commitment for production.

A Failed Attempt to Use Coal Miners in Tungsten Hardrock Mines

Clarkson: And at one point--this was probably the period of 1943, '44--they ordered the release of known mine workers from the army to work at Stibnite. Well, typical bureaucratic--somehow they sent forty-some-odd fellows. They were coal miners. Had been coal miners in West Virginia or Kentucky. They were--if we had had potato diggers, they would have been more useful and capable. Those fellows they sent out from the army, most of them had to be turned back because they just couldn't handle the climate and work. They [chuckles] couldn't do anything productive. They were totally ignorant and unskilled in that type of hard-rock mining and the environment they were in. So then long hours, sometimes sixteen hours a day. There wasn't overtime then, either. You just worked overtime at the same hourly rate. Lots of fellows often worked until they dropped. But we met production demands right along. There was never a time--by hook or crook, why, we kept getting it out.

Swent: Did you ever have any black workers?

Clarkson: No.

Swent: I heard there were some at Hailey.

Clarkson: No, I never--there wasn't--like, in the Boise Basin, there were two or three old-timers that came in with the early settlers that came in--but there was a lot of black workers in Oregon, both in forest work and shipyard work. The greatest number of blacks in Idaho were the railroad workers, the Union-Pacific Railroad. Pocatello, Idaho, had quite a--because that was a terminus point in the railroad. Boise had a few blacks, but they were just in service work, like the hotels and some of the wealthy families that had servants that were black. But very few. And north Idaho didn't have any blacks to speak of.

Swent: You don't recall any in the mines.

Clarkson: No. The mine workers in all the area were mostly Europeans--Finns, Irish, Cornish, Welsh and Swedes, Scandinavians. Long Valley area, where we have our house, that was quite a Finnish settlement. Not many of those Finns came directly from Finland; they came from Wyoming because they first came to Wyoming, some in the coal mining. But they came to Idaho to do farming and logging, and some of them worked where there was gold mining and things like that. And German.

My mother was German. Her parents were pioneers in the area. Then it became a mixture of the Irish and all of the others. The Irish are predominantly Catholics. My grandmother Clarkson, her forebears were Irish. My grandmother was educated in Catholic schools.

Swent: I had heard, though, that the army had sent some black workers out to work in some of the mines.

Clarkson: We didn't have any at Stibnite. They were West Virginians, Kentuckians. But no blacks. We only got one black workman, and he was a smelter expert. He had worked in the El Segundo antimony smelter--El Segundo, California--and he was a furnace, a fire brick expert. But he was just hired for the construction of the smelter {by W.K.E., the contractor}.

The El Segundo antimony smelter was a war production facility, like Henderson, for the magnesium production.

Swent: What was your first job, then, at Stibnite now, when you went back?

Clarkson: Construction and mechanical--

Swent: What were you actually doing?

Clarkson: Getting the mill expanded and reorganized for the tungsten metallurgy, for the recovery. They had this high-grade tungsten, as high as 6 percent scheelite. The old mill that they were starting out with was just a nightmare, and a lot of the tungsten was going out with the tailings. So there was a crash program to get the tungsten production up and also get the recovery up to where it should be because an awful lot of it was being lost. Not much over 50 percent recovery, which was terrible.

The fellow that had been mill superintendent had left. He had no experience. Leroy Handy had been mill superintendent at Kellogg for many years, at the Bunker Hill mill, so he was brought down and even though he was a pretty well-known metallurgist, his expertise was all in gravity concentration, not flotation or any of that, so he tried to do things his way. They put in a whole bunch of concentrating tables and it was then during the wintertime, 1941. Put foundations on frozen ground.

When I got there, the foundations were shaking more than the tables. And there was pipes every which way--head-knockers, as we called them. I didn't mention before: Bob Baker was young--my contemporary. He had a good background, but he was quite handicapped. He had been in a cave-in at the Spanish Mine, and his head--brain severely injured. And he had tunnel vision from the injury. It was hard to work with him because he had to walk real slow because he couldn't see. He had to take steps in the mill very carefully--he was a well experienced and knowledgeable metallurgist, but he was so handicapped in getting things done in good time. Too he wasn't very happy with Mr. Handy because Mr. Handy was a gravity man, and this obviously had to be done by flotation to get the separation, and so he welcomed me with open arms. And I had the patience to recognize his handicap and explain things to him, what I thought should be done. So all of that went well.

Mr. Handy was real cooperative with me, too, because then--instead of him assigning work--I was assigning things that I needed. In that manner, he was just an excellent fellow--here he was, an old hand, and I could get mechanical help from him that I needed, but not use his methods of actual processing. So it was interesting. That ten years was quite an experience.

Swent: It was a crucial period.

- Clarkson: Yes. Of course, then there was always the expansion, new crushing plant designed to be an open-pit operation and deal with open-pit mined ore with tons of snow getting mixed in with it in subzero weather. Then came the old Ima Mill, the original Ima Mill, to rehabilitate. Then on a cold winter day it caught on fire and burned it to the ground. So I had the job of planning and building a whole new mill on that operation. So there was never a lack of challenges. Fortunately, I was able to deal with them. And in the course of that, a lot of new methods--like the hydrocyclone. And then bringing rod mills back into use and being responsible for the largest rod mill that had ever been built. {When I say "I" it was always with a great team working together and I was delegated to get the job done.}
- Swent: I don't think we're going to have time today to get into that.
- Clarkson: I think you'll have to spend some time--
- Swent: Next time. It's too bad that we have to stop. The rod mills and the cyclones and the valves and all those things are still to come.
- Clarkson: The new crushing, conveying methods that were--all of those--sticking the neck out for a better way of doing it.
- Swent: Yes. And using things that you had learned already, I'm sure.
- Clarkson: Yes. Well, with the help of others. My employer, Bradley, sent me along with others that worked with me, to make decisions, sent us to Climax to study because they had developed new crushing and conveying, especially notable, conveying methods in the crushing system.
- Swent: Did you ever visit any of these few other places that had similar ore? I think one was in South Africa. Of course, you couldn't go to South Africa during the war, but there were a very few other places in the world that had this same kind of ore. Did you ever visit any of those places?
- Clarkson: No, no. But Jim Lange, a long-time mentor, co-worker--He was a long-time metallurgist for the Galigher Company in Salt Lake. He was known worldwide. I got lots of feedback through Jim Lange on South Africa.
- Swent: Did you? Let's see. There were only three other places in the world. A mine in Turkey, Australia--oh, not South Africa--and Czechoslovakia.

Clarkson: Yes. I got to Australia, but not Czechoslovakia, even though we had equipment go there in later years. I had a planned trip to South Africa all set up and everything, and then something happened that I had to cancel it, so that was one big area that I never got to go to, was South Africa. But, as I say, I got lots of feedback from Jim Lange.

And then I had quite a lot of communication with South Africa. Some of it pertained to the Indian Valley mill, on the crushing set-up in South Africa. An operator wanted to know how it was handled. Frank Coolbaugh--I think it was Frank--it was one of the Coolbaughs--had also been general manager of Climax. He was with Cyanamid and also Fraser and Chalmers in South Africa. I had an exchange of communication for methods.

Swent: That was an exciting place to be.

Clarkson: Yes. Thinking about it. So the little feeder opened the door for lots of interesting things for me. I was able to, you might say, capitalize on it by getting a job and doing the job and then going on to next things. I had a good helpmate, Edna, homemaker that went along with all these moves. Not the work, but always the homemaker.

Swent: Backing you up, yes. Well, this probably is a good place to stop then, Bob.

IV RETURN TO STIBNITE, 1942

[Interview 4: February 23, 1998] ##

Construction and Mechanical Superintendent

Swent: We have had a recess for a few weeks. When we last talked, you were still at the Klondyke Mine and just getting ready to go to Stibnite. How did you happen to go back to Stibnite? Did they get in touch with you?

Clarkson: Earlier that year in 1942 with a number of friends still there, and my parents were also still there. Dad was a millwright on the job, so while we were there on our vacation trip, why, of all people Otto Brown from American Cyanamid was there, working on the metallurgy with them. They were in a big dilemma; they were losing so much of the tungsten in the old mill; the metallurgy for the scheelite other than gravity methods was pretty meager at that time. Otto Brown told Jack Bradley, "You need Bob Clarkson here." {What a boost!}

Of course, I knew Harold Bailey well and I had met Jack on other occasions in California, so I had a meeting with them and they took me on a tour of the mill and everything to discuss the problems and so forth, so along with Otto Brown at that time, and then Roy Handy from Bunker Hill was also there, trying to help out on the dilemma that they had. So it was agreed and I accepted the challenge to come back to Stibnite because, too, I was in the position that Klondyke {the Grand Reef mine} had been turned down by the War Production Board, and so I was just in limbo there, and it was a nice opportunity to come back to the old campgrounds.

Of course, my dad was real pleased with that decision. So from that, we wound up our vacation and went back to Klondyke, and I turned in my resignation to the CEO of the company {Calistoga Mining & Development Co.}, Hugh Martin. He was

pretty disappointed because he still had hopes of making something out of Klondyke. With my loss, he just decided to liquidate the facilities at the Grand Reef mine.

Then, with family, we came back to California and gathered up our belongings there and with all of that, some shipped and with a trailer, why, we headed back to Stibnite in September to take on my new job.

Swent: What were you driving?

Clarkson: A Pontiac sedan. It was one of the last available Pontiacs, had a straight eight-cylinder engine. {World War II--no more new cars available.} And then that Pontiac I had, when I got back there and established, the company made a company car out of it, so I drove the Pontiac, the company Pontiac, all during the World War II years. The first new car that we got after the war was over was a Dodge. The Dodges were some of the first postwar cars off the production line. And Bradley got a fleet of Dodges for the company staff. I think there were six of them--the first new cars delivered after World War II.

Swent: When you had been in Stibnite before, they had been mining gold and antimony.

Clarkson: Yes. Just the original concentrator. That's all they had to start with when tungsten was discovered.

Swent: The tungsten was discovered in 1941, before you got there.

Clarkson: Yes.

Swent: This is what gave it new impetus to--

Clarkson: Yes, because they had even had a period, a shutdown, in the late thirties because the Meadow Creek mine--all of the developed commercial ore there had been worked out. But there was gold ore down toward the Yellow Pine area. It's known as the Hennessy property. That is where the early operation started to drive a drainage tunnel in from that site--{known as the Monday tunnel}.

Swent: Was that the tunnel that you had worked in earlier?

Clarkson: Yes--they were trying to develop another source of more ore to keep the mill running and had sunk a shaft at the pit site--there was, of course, no pit there then--to try to get millable grade gold ore, if they could make it. The mill was only being operated periodically, with some development ore. And the

drilling program, the Bureau of Mines (U.S.B.M.) drilling program, in that area--they discovered the tungsten in that ore body near where the shaft was located. So the first tungsten ore, scheelite, was mined underground, and it was high grade, some as high as 6 percent.

A Crash Program to Process a Tungsten Bonanza

Swent: This was a very critical mineral.

Clarkson: It was very critical. And so they started out by working to adapt the old mill. Mr. Handy from Bunker Hill was a well-known gravity concentrator consultant, so he was the first one called in. He added tables, concentrating tables, to the mill, and this happened in the wintertime conditions, putting in the tables, rushing, a crash program. They put the foundations on frozen ground, in an unheated section of the old building, trying to adapt the existing flotation to it and calling in the most eminent metallurgists--Jim Lange from the Galigher Company and Otto Brown from [American] Cyanamid and fellows from Bunker Hill at Kellogg, Idaho.

But the first one that had a hand in it was Mr. Handy because the mill--they had very little experience with flotation of that complex ore with tungsten present, so the gravity [concentrator] section was losing a lot of value down the tailings.

Swent: I don't understand why the USGS and U.S. Bureau of Mines got into the picture.

Clarkson: Well, they were drilling, looking for more antimony because the Yellow Pine, Meadow Creek mines were the best-known antimony deposits in the U.S.

Swent: But why didn't the Bradley Company do their own exploration?

Clarkson: Well, they were pretty hard-pressed right then, with Alaska-Juneau gold only \$35 an ounce and so forth, so it was an opportunity for the Bureau of Mines and also the War Production Board because the reason they were looking for antimony was for battery lead, submarine batteries, and also antimony was a major element in flameproofing paint for naval vessels. It was used as not only a base element, like lead, lead in paint; antimony was a well-known flame retardant but hadn't been used, known by the military. So that's why the government, U.S.

Bureau of Mines, came in. They were doing the exploration, just helping out--pushing it along.

But when the tungsten was discovered and brought into production, it was a major discovery--the ore was so high grade, there was never at any time any support price paid by the government. Other tungsten producers, like Bishop [CA] and some in Nevada here--it was low-grade tungsten, so they qualified for support price from the War Production Board. But all of the work at Stibnite was done with Bradley Mining Company resources, without any--as I say--without any support price--and they had support price at one point on copper, even, I think. And molybdenum. Strategic metals, all that were needed. Manganese. So that was part of the war effort.

Swent: I thought before we get into the details of what you did, you might speak about the location of this. It seems unusual to me that the mine site was downstream of the mill.

Clarkson: Yes. {Mile and a half.}

Coping with Wartime Shortages by Recycling Equipment

Swent: This is a little unusual, isn't it? Usually you try to put your mill downstream of your mine, don't you?

Clarkson: Yes. That happened because the original mine, the Meadow Creek Mine, was right at the mill site. It was an underground mine. So from then on, very little new equipment was available by 1942, and so the effort was to use the existing mill and all the associated equipment at the site and so continue uphill.

Swent: And the tailings were also upstream.

Clarkson: Upstream, yes. That was the reason for long-distance pumping because the best site, the next best site in the valley, was upstream from the mill.

Swent: And this was best because it could easily be dammed?

Clarkson: Yes. Building the berm, and it could be made in a separate area isolated from the main water supply for the hydro plants below. And the original operation there of mine air compressors and the mill was all powered with the existing hydro power plants. But then there wasn't enough water and not enough generating capacity to power the expansion, so that was

another crash program. They did build one more hydro generator on downstream from the existing one, but it was still inadequate because, there again, there wasn't enough fall to provide enough power. So then, in the crash program, they started bringing in diesel generators, so we had all of that--like the mill dilemma, we had a power dilemma to coordinate hydro plants--three hydro plants--with several diesel power generators.

Swent: Did you get in on that, too?

Clarkson: Yes. My concern was to have enough power. I didn't head up the electrical work. Bradley had others for that. But my work had to be coordinated to know that we were going to get enough power to run the increased load of crushing and grinding, the concentrating machinery and all of that.

Swent: Had the river been diverted or the stream been diverted when you got there?

Clarkson: Only a creek--Meadow Creek--for the power plants.

Swent: For the mine.

Clarkson: Yes, they drove the Bailey tunnel to bypass the Meadow Creek around the pit site.

Swent: So this was the east fork of the south fork [chuckles] of the Salmon River?

Clarkson: Salmon River. {South fork. It became that at the confluence of Meadow Creek and Sugar Creek below the mine site.}

Swent: And it had to be diverted. And that had already been done when you got there?

Clarkson: No, that was in the works. That's where Tony Mecia came in as chief engineer, into the picture. He had charge of the tunnel job. {M-K [Morrison-Knudsen] had bid on it but the company engineers thought the bid way too high.}

Swent: And Bailey was the resident manager? Jack Bradley was the VP and CEO?

Clarkson: Yes.

Swent: And when did you get there?

Clarkson: September, 1942.

Swent: September '42. How much were you paid?

Clarkson: I don't remember. It was pretty good then. I think something like \$800 a month. Between \$600 and \$800 a month, with housing and transportation and all of that.

Swent: Medical care?

Clarkson: Yes--(in that period the company built a well-equipped hospital and completely staffed it with a doctor and nurses).

Swent: Vacations?

Clarkson: Yes, vacation. I had a special insurance policy because I was also a company pilot in later years.

Swent: So you had extra insurance.

Clarkson: Yes.

Swent: The company provided all that.

Clarkson: Yes. But senior staff members all had extra insurance provided by the company {with Lloyds of London}.

Swent: So that was a good salary?

Clarkson: Yes, it was up from my manager's salary at Klondyke. But I can't quote exact figures. I've forgotten. But that was--it might not have been that much [looking through papers, or turning pages].

Swent: In that area, anyway.

Clarkson: But this--

Swent: Oh, this was the employees manual. September 1948. Oh, this was quite a little later.

Clarkson: Yes, that was in later years. I just don't remember what my-- but we didn't negotiate then for salary like is done now. {Wage surveys were made quite often--company policy.}

Swent: You took what you were offered?

Clarkson: They sent a letter to us, and that was fine. [My attitude was] I'll try to do the job.

Swent: I see here in 1948 a construction foreman--his base hourly rate was \$1.70 an hour. And time-and-a-half was \$2.55. A laborer made \$1.20 an hour. The truck driver of a 5- to 15-ton truck made \$1.40 an hour. A diamond driller made \$1.55. First accountant made \$1.55. Janitor made \$1.20. And the lowest on the scale was the waitress {cookhouse--hasher!}. She only gets \$1.00 an hour. Things have changed a little bit, haven't they?

Clarkson: {Job evaluation included employee committees. Remember--housing, utilities, hospital and recreation facilities were furnished. Workers lived within walking distance of their work place.}

Personnel Manager, a Wartime Innovation

Swent: What sort of house did you have?

Clarkson: Nice housing for all the employees. That was our first experience in having a personnel manager. Most mines of this size, the superintendent and other staff members usually handled all the personnel problems: hiring and firing. But that was a nice wartime created innovation to have a personnel manager. That started, I think, during 1943--{a time of war and other war production--capable workers, men, were scarce people}.

Swent: Why did you think this was better?

Clarkson: It helped because it took the problems of taking care of the employees' problems and even hiring new employees for a job--the personnel manager was the head hunter for anyone available for a job--the first interview. The personnel manager determined whether they were suitable for the job that was needed. That came along, too, with the war effort because in trying to meet the demands for tungsten and antimony because of the draft and what could be done with older men and military rejects. That's all we were able to get. So they {the manpower commission} then released a group of so-called miners to Bradley Mining Company. I think there was somewhere between thirty and forty that was released from the army that were called miners, but they were coal miners from Virginia and Kentucky. They were just about as useless in that area of hard-rock mining as just picking up fellows off the street. Well, there wasn't any on the street to pick up! Very few of them worked out. The company had to let some go because they just simply were not adaptable.

Swent: Were they all white?

Clarkson: Yes. There was no, as I remember, no minorities among them at all. The only minorities we really had on the job were a couple of Chinese fellows and a Filipino. They were--one Chinese metallurgist, Si DoFoo, that was Canadian-born, and I helped him become a U.S. citizen. And then from Stibnite he went on first to the East Coast with Dorr-Oliver and then back with Utah Construction. In his college years he got some scholarship help from his Canadian home, Calgary, to attend Golden [Colorado] School of Mines, so he was a graduate of Colorado School of Mines. {The other was John Jan, also a metallurgist with smelter experience. The Filipino, Paulino Cases, a graduate student from Stanford, worked in the engineering department.}

Swent: Did these coal miners have to go back to the army then?

Clarkson: They had to go back to the army. I guess they didn't have any other choice. And we got some fellows back out of the army that had been in reserves. The army released them because they had qualified mining or metallurgical [experience].

Upgrading the Crushing Plant

Swent: What was your very first assignment, then, when you got back there?

Clarkson: My first assignment was all with the old mill and its existing crushing plant.

Swent: Had the pit been developed?

Clarkson: No.

Swent: What was the stage of it?

Clarkson: No, it had yet to be developed by stripping the overburden. When I came in, the ore was still coming from underground at the so-called Yellow Pine Mine site--{Hennessy property. Al Hennessy, discoverer.}

Swent: And there was a crusher.

Clarkson: Yes. But there, again, the crushing location was all at the millsite, and the ore was being trucked. At my coming in, they

were just putting in a larger--second-hand--gyratory crusher and a larger primary crusher, also second-hand. I had the job of finishing up, and getting them running. Most every day there was periods of shut-down because they were also dependent on the two older units that were alongside, and also adding grinding capacity. And then taking out the tables and adding flotation because the metallurgists that I mentioned, they were getting it all converted over to flotation--{a nightmare at times! And that had to be mechanically prepared for.}

Swent: At this point, where was the crusher {section}?

Clarkson: All at the millsite.

Swent: At the mill. I see.

Clarkson: The old crushers were up to 200 tons capacity. The new crushers were an effort to get the mill up to about 500 tons a day.

Swent: I read that the crusher was unique in both its location and design. What was unique about it?

Clarkson: Well, there wasn't anything unique about the old mill crusher facility, except just the job of upping the capacity. The unique aspect of a new crushing plant was to put it at the pit. The old crushers at the mill were scrapped {and the building was used for the new rod mill and a crushed-ore bin added and designed for pass-over truck haulage}.

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Swent: How was the crusher location decided?

Clarkson: It was from a lot of research that involved all of the senior staff as well as the Bradleys. That was the purpose of our trip back to the Iron Range to study pumping and conveying methods, and we made trips to Climax because they had similar climate and related conditions to deal with--snow problems and all that. Also consult with the mill superintendent and mine personnel. We made trips to Climax primarily to study their crushing and conveying system because they were all higher-capacity units, and we were--in the expansion period the goal was to bring the crushing and mill capacity up to 2,000 tons a day.

Swent: Prior to this, there had been how much grinding and how much crushing? I read that two-stage grinding was something significant.

Clarkson: Prior to the two-stage grinding, that's where the rod mill history came in--for two-stage grinding. During all the war years, it was two-stage crushing and one-stage grinding. That's as far as we could go because of the snow and cold. And to primary grinding. And then, with the advent of the rod mill plan, then it became two-stage grinding--(the rod mill was dubbed a tertiary crusher).

In the earlier years, we just kept adding ball mills. Most of the equipment then was second-hand equipment from shut down gold jobs, or wherever we could find it.

Swent: Because of the war.

Clarkson: Yes, mostly.

Swent: Did you go to the Shasta Dam? Did you go out there yourself?

Clarkson: Oh, yes. That was in the search--I found that they had a rod mill in their sand preparation plant, and then that led to all of their long-distance aggregate conveyance, their gravel plant and their mix plants--that equipment was all for sale. And it was good equipment, immediately available. As well as we couldn't get it without a long wait from the conveyor companies, Stephens-Adamson Conveyor equipment and others. So that was not only a good buy but it was available right at the right time. {The rod mill was too small.}

From our various trips, staff members prepared cost reports, put all these things together for what the Bradleys were capable and willing to spend.

Swent: You were doing a lot of things at once, weren't you, actually?

Clarkson: Yes. {And much had to be done during a short summer season.}

Swent: You were planning the upgrading of the mill, and they were changing the mine then from underground mining to an open-pit mine.

Clarkson: Yes. There was a long period of a stripping operation to get the ore uncovered to mine it, and the Bailey tunnel, the bypass tunnel--all of that had to be completed in a scheduled time. The schedule was pretty well met. There was always a good team to work with on the senior staff, the electrical superintendent, the mine superintendent, the manager, and the chief engineer. The mill superintendent, and I was the one who had to tie in--except for the mine, like the tunnel and the mine development. I had nothing to do with that except to be

coordinated with mine development, getting site preparation done and so forth and, in the course of that, making the plans for the new crushing plant--{foundations in and buildings up during good weather}.

Swent: I guess we should say what your title was. You were construction superintendent?

Clarkson: Construction and mechanical.

Swent: Construction and mechanical superintendent.

Clarkson: Yes. And then eventually I was--the construction part--I was over all construction: housing and so forth. But then they had a subcontractor that had worked through all of this on housing, and even some of his crew was used on the crusher construction at the pit. And in the late years Western Knapp [WKE]; Wemco had been a supplier through all of the period, and then WKE came in on later-day construction. {Western Knapp or WKE was an engineering/construction division of Wemco. Harry Howe was the founder.}

[tape interruption--lunch break]

Swent: You were just saying that you had had Western Knapp come in for consulting and, I guess, did some of your construction also.

Clarkson: Yes. That led to construction. The earlier days, we built up our own crews, like the different areas. Even on the first crushing, pit crusher construction job, I called in Guy Burch, a fine millwright, to head up our company crew. Guy Burch was the one from Tonopah that I first met on the Greenville job. He was still pretty active then, and so fortunately he was still available for the pit crusher job. But then, as the job projects become larger and more complex and all, then we went to outside engineering for help.

Very Nice Company Houses

Swent: I asked you first about your house, and then I didn't follow up on that. Let's say just a word about what kind of houses you had there. What were your houses like?

Clarkson: They were very nice houses. Modern.

Swent: Your house, for instance. It was built of frame construction?

Clarkson: All frame because we had a company sawmill, too. The only thing that we brought in from the outside--and of course that was also sawmill country--finishing materials. But all the rough lumber--like framing, siding, roof construction--it was all out of our company mill, which was--the mill was down near Yellow Pine, where we had beautiful big yellow pine Ponderosa trees and spruce, big spruce trees. That was the source of the mine lumber. Timber and everything--all company operations.

Swent: [looking at picture] We had looked earlier at that picture of the houses. How many bedrooms did you have?

Clarkson: Oh, they varied. The housing contractor--he was a local fellow {Hubert Martin} that I had known since we were youngsters together in the Emmett area--he had done quite a lot of housing construction in the Boise area, and then when the tungsten boom started, he got the job building the company housing. He was a good architect, too. He had two brothers that worked with him; one was a good equipment operator, catskiner, and the other a good foreman. And so he put the house building crews together --cost plus.

{Tents were used in the early 1930s!} But the company started out taking care of the overflow with house trailers. Some of the earliest house trailers that were built. Oh, a bunch of them. Towed them in behind a truck. That was for the emergency housing. And then later he started out with two-room houses, but designed so they could be moved together and make a larger house that way. The next stage of adding housing and so forth and upgrading it, they put those together.

And then some of the old mine buildings were remodeled into apartment-like structures, as well as building condos, rather duplex houses. When we went back, the first one that was available for my family was a duplex, so we had a neighbor in the other half of the duplex. The duplexes had an upstairs, and they were sometimes three-bedroom, but we had two bedrooms.

The houses were all furnished with a maintenance charge because an occasional employee could be very abusive, so the maintenance fund was--the cost of if they had family or a couple in one that did a lot of damage to it, didn't take care of it because that was their responsibility, then the maintenance fund would put it back in shape for the next occupants.

So that's part of where the role of personnel manager came in, managing the housing for new employees or--a number of babies were born there--they would put in their applications if

they had even just a one-bedroom house, they could upgrade to a two-bedroom and so on when available. There was always some shuffling in the housing.

As I pointed out there was a school, a hospital, a recreation hall, and a service station. That was the central community, and it was midway between the mill site and the administration site and mine site. And then there were housing areas for the mill site, and there were housing areas for the mine area. {A company town--but it did become an incorporated village with a council, etc.}

A Company Town of 1,200 Population

Swent: What was the total population of this community at that time?

Clarkson: I think the maximum got up to about 1,200, as I recall.

Swent: All employees of Bradley.

Clarkson: All employees, yes. Direct or indirect. Like, we had a service station: the service station had an apartment above it, and the fellow ran the service station; his wife had a beauty shop [chuckles] there, and he also had the garbage truck, and so he was the garbage man.

Swent: He wore several hats, then.

Clarkson: And the store: first it was owned by a Cascade person. That followed it being just a company commissary in the early day. A long period of outside ownership. And then that was purchased by the employees. So the employee corporation was formed that owned the store, and the manager of the store worked for the store co-op, and the employees had stock in the store.

Then the recreation had the recreation committee, and they managed all recreation. That tied in with the school because the company actually built a schoolhouse but they got county--. In the period of my return there, they incorporated the village and then started getting tax money back from the county. And that mine operation was a third of the total assessed valuation of the county during that decade of the forties and into the fifties.

It was always interesting activity. The recreation committee, they had charge of some of the school extracurricular activities, sporting events and the dances and the movies and the bowling alley and all of that. Mostly all came under the jurisdiction of the recreation committee.

Swent: This committee was a company committee?

Clarkson: Company employees. The company participated, of course, because that tied in very closely with the personnel manager that really administered a lot of--(his assistant was also the fire chief).

Swent: When the town became incorporated, then the town became a government--

Clarkson: Yes. In that period of incorporation, a village had to be incorporated to have slot machines, for example. So in the club, in the recreation hall, then they could have slot machines.

Swent: Was that one of the motivations for incorporating?

Clarkson: Well, yes, because from the slot machine take, the village got back 15 percent of the take from them, and that in effect was turned over, I think, to the recreation department. It went in for Boy Scout activities and Girl Scout activities. All fit together--a well-managed community.

Swent: What about things like water and sewer?

Clarkson: That was all company. That was company houses and so forth. There again, we had a subcontractor; in that period all of his work was with the village, putting in septic tanks. The last construction of the smelter, when we added a lot more homes, we actually put in a sewer system for those houses, with septic treatment collection for that.

Then, of course, we had to have the garbage, trash disposal. Some of that, the best way of disposing of it was to bury it in the waste from the mine pit, the stripping from the pit. Why, the trash and garbage would be dumped into a cut and buried. In effect, became a landfill. But all a part of the mining operation.

Swent: And they could do all of that in those days without applying for permits.

Clarkson: No. The only ones that we really had to deal with were the state on checking the stream flow, the quality of the stream flow, and their main concern was the mill tailings.

Swent: Did it have some state oversight on that?

Clarkson: Yes, yes. In the last years of the operation, one of the big projects was to prepare for a new tailings disposal area, and the state health was there--and they also checked the quality of our water, because--all the houses had water and inside plumbing.

Then, of course, then the state mine inspector was a very important function. We always had a very regular visit for inspection and approval from the state mine inspector.

Swent: Did he have any authority over your housing and your other buildings?

Clarkson: No, no.

Swent: Only the mine and the mill.

Clarkson: The state health department. There was always a good working relationship then. There wasn't really any of the weight-swinging. They were more--acted in a more advisory capacity, rather than a regulatory capacity.

Swent: I was wondering also about the power. You were producing your own electric power. And then later on, did you tie in with any larger power--

Clarkson: Built a 110-mile power line. The new smelter was an all-electric smelter, and it was based on being able to get lowest cost economics of it. The feasibility was based on being able to get low-cost power. And an agreement, contract, was made with the Idaho Power Company. That was all hydro power from the commercial supplier. They built a 110-mile power line to Stibnite. But there was also the Cinnabar mercury mine that they could serve, and they could also serve the area in between, especially Long Valley towns. That was from Emmett, Idaho, to Stibnite.

Such as Cascade, McCall, and the intermediate places along the way, some had their own hydro plants at that point in time because they were small villages. They were able to get the tie-in to the main line. And also the mercury mine that had had to generate their own power, United Mercury. They got

power, too. And that was an extension of the line on beyond Stibnite.

Swent: I think this is when you also got telephone communication, wasn't it?

Clarkson: Yes. Well, that was a new electronic development. The Idaho Power Company had developed what they called a carrier current system that the telephone signal traveled on the main power lines, so they provided that technology to the mining company, so then our telephone service actually utilized the power lines. And then the nearest town, Cascade, where it tied into the current telephone company system there.. That all had to be worked out. So the company had its service.

Up until that time, our emergency communication was by the hand-cranked phone or HAM radio. We had a HAM radio operator all during the forties, starting in the thirties. That was very helpful, for lost airplanes and hunters being lost and emergency things like that. Our HAM radio operator was a very important asset--{sometimes a key person in emergency communications}.

Swent: Did you ever do any of that?

Clarkson: No, I didn't, really. My only use to that extent was just the aircraft radio, communicating the usual. We had unicom that we had on the plane. I used that a lot.

Serving as Company Pilot

Swent: Well, you did quite a little emergency work with your airplane, too, didn't you?

Clarkson: We had the company pilots. For the most part, they were based in Boise--Bradley Field--but I was the company pilot that was most always [chuckles] right there on the job.

Swent: Where was the pilot based?

Clarkson: In Boise. Bradleys built an airport. They started at the old Boise commercial airport, which is now the campus of Boise State University. Bradleys, in the beginning, when tungsten was discovered, stepped up the use of aircraft for travel because of the snow and closed roads and all of that. Bradleys

first bought one of the fixed-base operators at the Boise municipal field.

Swent: Fixed-based.

Clarkson: Fixed-based. It was for servicing airplanes and had mechanics and instructors. They called them fixed-base operators.

Swent: They kept that company plane there in Boise?

Clarkson: Yes. Jack Bradley had his personal plane, then the company plane--the company pilot {Ray Crowder--first company pilot} and the company mechanic and all of that.

Swent: So you were not officially the company pilot.

Clarkson: No. Later on, I was a company pilot, {after building up my mountain flying qualifications}.

Swent: I see.

Clarkson: But I was always at Stibnite, and I--in later years, the late forties, I was a member of the State Search and Rescue, Idaho, Department of Aeronautics, because I was way back there, where sometimes an airplane got lost and crashed or something, and so I worked with them on emergency trips--someone hurt, or sickness--I was right there so they'd get me off the job or call me at home if I could make a flight.

Swent: Did you have your own plane?

Clarkson: I did for a period. I had a little Cub airplane that--

Swent: Piper Cub?

Clarkson: Piper Cub, called a J-3 Cub {NC 27143}. I would sometimes do patrol. If they had some trouble on the power line, we would go out and check on it. Used it a lot for photo taking. Used to go up and take some photos. And from our company plane, too. I had skis for it. In the wintertime, I could land in a lot of places where another plane couldn't. Things like that. {Sometimes loaned it to other qualified pilots.}

Swent: Did your wife ever learn to fly?

Clarkson: No, no. She was not of that bent. Edna, she was always glad to go along, but she was never an avid flier.

Swent: What about Claudia?

Clarkson: Claudia was a lot like her mother. But Claudia's daughters [chuckles] are very interested in flying. The kids made some trips, along with business trips. Like Edna and the kids or one or the other oftentimes went along if I wasn't taking a company employee and things like that.

Son Curtis Clarkson, an Assistant Pilot at Thirteen

Swent: You said that Curt began flying very young?

Clarkson: Yes, because he got to go along when I'd be making a trip to Boise or to Kellogg, Bunker Hill, and we would sometimes stop over in Spokane. Sometimes the weather stopped us somewhere along the way. Curt helped his dad fly a whole lot on some of those trips--{took the controls so Dad could relax a bit}.

One time--this was after we started the business--we delivered an airplane load of feeders to Butte, Montana, for Anaconda, {a round trip in one day from Boise}.

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Swent: You were just saying you were delivering some feeders to Anaconda.

Clarkson: Yes, to Butte. Another time made two trips in a day. To Kellogg with centricle parts--{didn't have enough parts the first trip}. Our first adventure into cyclone work, Kellogg Krebs found a mechanical engineer {Norris Goodwin} in San Francisco that had patented a mechanical hydrocyclone. It had the impeller built into it. And we acquired the rights on that patent. One of the early units that we put in was in the Bunker Hill mill {after Stibnite tests}. So I flew up there to help them out with it after they installed it and to get some operating information. Curt went along with me on that occasion--{good experience!}

We got up there, and we found that they needed some new parts. They had damaged some parts. So we got in the plane, flew back to Boise and picked up the parts that we needed, back [chuckles] to Kellogg from Boise and got it fixed up and running again. Well, that was quite a bit of doing, so Curt, part of the time, he flew while I took a nap. {Nice summer day.}

Swent: How old was he at that time?

- Clarkson: Well, let's see, 1951. He was, I guess, about thirteen. He was getting to be a pretty good teenager at that point.
- Swent: How far away was Bunker Hill?
- Clarkson: From Boise in that--{a Cessna plane}--we had close to a two-hour flight--{a long day}.
- Swent: Quite a ways.
- Clarkson: From southern Idaho to north Idaho. It was pretty close to a two-hour flight, one way--{then the Kellogg airstrip was right alongside the BH [Bunker Hill] mill--built on old tailings}.
- Swent: Well, maybe we should--I'm trying to think how to pull things together here.
- Clarkson: What we're really talking about is the period of the forties there, and then anything mentioned about Clarkson Company, that's after 1950. So the partnership was formed in January 1950, but I still worked for Bradleys up until 1952.
- Swent: So in the first years, you were concerned mainly with tungsten as well as antimony.
- Clarkson: Yes.
- Swent: But the tungsten was the thing they were pushing for.
- Clarkson: Well, really both because they were, you might say, equally strategic minerals for the war years.
- Swent: They made a distinction in one of the articles about optimum economic recovery as opposed to maximum metallurgical recovery and concentrate grade, but you were trying for both, weren't you?
- Clarkson: Yes, right, {each, a separate concentrate, had to be trucked out to rail and on to refining}.
- Swent: But it was very tricky adjusting.
- Clarkson: Well, there had to be brought into play a whole lot of new expertise both in antimony and tungsten production. It was--up until the needs of World War II, a lot of the source of antimony was foreign source. Tungsten was not being adequately supplied, the different tungsten minerals, like the operation at U.S. Vanadium at Bishop {CA} and some production in Nevada. But the wartime upsurge in the need for tungsten was for armor

plate, armor-piercing missiles, high-speed cutting tools, abrasion-resistant wear parts and electrical--there was a tremendous upsurge for the need of tungsten in alloys.

And then antimony: there was a big upsurge there for the need of so-called hard lead or battery lead, which--a higher percentage of that battery lead was the antimony metal. A big use, an early use for antimony was printer's type. Printer's type used a large percentage of antimony in the alloy for its melting and hardness characteristics. As compared to lead, antimony was a hard, brittle white metal. Pure antimony.

Another early use for antimony was in babbitt because antimony, as one of the white metals, has an unusual characteristic that, when heated, it shrunk and when it cooled, it expanded. That was its use in making pillow-block bearings with babbitt metal. Antimony, when the bearing heated, the alloy didn't expand as much as it would if it was just a lead bearing or lead and zinc. That's what babbitt was, an alloy of lead, zinc and antimony--(a big early use--railroad car bearing boxes).

Swent: That is interesting. So they were working to get both the antimony and the tungsten out of this--

Clarkson: Stibnite ore.

Swent: But then the tungsten ran out.

Clarkson: During the war years, the tungsten, commercial ore was worked out.

Swent: They mined it all out.

Clarkson: And they hadn't been able to develop any new reserves of tungsten. Most of the reserves that were left at the end of the war was gold and antimony ore, especially gold ore that remained was oxidized.

Swent: In later years they were just drilling for antimony?

Clarkson: No; in the late years and current time, it has all been for gold. Unfortunately for Bradleys, the new market price for gold was so long in coming, it didn't save the operation for Bradley. And there was a good market for antimony outside. That was one of the major products of the new smelter, was antimony oxide.

Swent: The smelter was later.

- Clarkson: That was a year after the war, the late years of the forties.
- Swent: Yes, because one of the things I read was the discussion about treating the concentrates locally. At first they shipped the concentrates out.
- Clarkson: Yes. All concentrates had to be shipped.
- Swent: They were shipped out by truck, were they?
- Clarkson: Yes, trucked to the nearest railroad point. That was Cascade. Cascade, Idaho.
- Swent: That was quite a ways.
- Clarkson: Eighty miles, about. Over two high summits. Yes, it was quite--
- Swent: Well over two hours.
- Clarkson: Yes. Nearer three. One round trip a day for a truck, {over a mountainous road}.
- Swent: I read something also about a distributor, that a special design was--were you involved in that?
- Clarkson: Yes. {Ore pulp distribution from the rod mill to the ball mills.}
- Swent: Was that later, or is this a good time to talk about that?
- Clarkson: That was later, in the last expansion period. That was part of the new rod mill setup--{grinding section}.

Recovering Three Important Minerals from a Single Ore

- Swent: I see. Well, let's just begin with the beginning. And the first thing was to expand the existing plant.
- Clarkson: Yes. And not only expand but improve the metallurgy in the recovery of--in the early days, there was just two requiring differential flotation. The gold, iron {Fe-Au} sulphide {arseno pyrite}, and the antimony {Sb}. When tungsten came along, it meant separating into concentrates three important minerals from a single ore.

Swent: And that was still all only flotation.

Clarkson: Yes; the success came from the metallurgy in flotation.

Swent: They had cyanided earlier {the Fe-Au concentrate}, and then they stopped that?

Clarkson: Yes, that was a failure. That was in the original plant, in 1931 and '32.

Swent: In the thirties. And the froth was cleaned twice. Was this unusual, that they went through four stages?

Clarkson: Yes. Well, there was the bulk flotation, and then the separation of the three: the antimony and--the gold, antimony and tungsten--especially the tungsten. There was two separations there. The high-grade concentrate and the low-grade concentrates. It became a slime factor at that point, and the slime, the low-grade concentrate tungsten, scheelite, was--the slime fraction made the low-grade concentrate, and then the high-grade concentrate. In the early days, the low-grade was trucked to Bishop because they had the facilities to upgrade it by a leaching process. Then Bradleys built their own leaching plant in Boise for the last--that was the last years of tungsten work. {Bob Baker became manager of that operation.}

Swent: That would have been in the middle forties?

Clarkson: The late forties.

Swent: Very complicated.

Clarkson: Yes, it really was. Without a lot of research, I have to draw on memory just how it all progressed. {My crew's concern was to put together the facilities to do it with.}

Designing a Special Distributor for the Rod Mill Discharge

Swent: And you designed a distributor that would keep the flow going.

Clarkson: The distributor. That was to the fine grinding circuit, mills. The purpose of that, the rod mill was the primary grinder and the discharge from the rod mill, the single rod mill, had to go to five different ball mills, and every one of the ball mills was a bit different, {Hardinge and Marcy}, so the distributor,

in order to keep a balanced load in each ball mill classification circuit, it was made easy for the operator to control it. Well, that was the purpose, not to overload any one mill. So the flow could be precisely apportioned to keep a balanced load in each one of the ball mills.

Swent: Was this in any way related to your feeder?

Clarkson: No.

Swent: It wasn't the same kind of mechanical problem?

Clarkson: No, no. It was entirely different because it was an agitator. The agitator was receiving a real coarse feed from the rod mill that settled rapidly and could cause problems real quickly. It had to deal with the density control too, and so it was just a big circular vat with an agitator mechanism in it, and the peripheral feed points for each mill had a weir, so when it was adjusted up or down, it automatically took away from or added to the others in the exact proportion that they were set for.

It was a little bit related to a distributor that we picked up. This reagent distributor was invented by one of my early bosses. You remember the name Hal Lewers?

Swent: Yes.

Clarkson: It was invented by Hal Lewers, the reagent distributor. It had been long forgotten about for years when I thought, well, it's a good time to revive the Lewers, so I modernized the design. Lewers was long dead by that time because it was in the late fifties when the need came up for reagent distribution again, so I added that to the Clarkson feeder line. But still, there was some need there that was the same requirement as dividing up the feed to the several ball mills. So that was an old invention that virtually disappeared for a lot of years and then brought to life again.

Swent: But you had it tucked away in your mental storehouse.

Clarkson: Yes, I guess tucked away, till I brought it back to solve a need.

Swent: Is there anything interesting to say about the aeration of the pulp?

Clarkson: That was predominantly a flotation requirement and accomplishing it in different types of flotation machine {and conditioners in the flotation circuit}.

Swent: And then they made quite a point of the fact that you put the slurry pumps in together, right next to each other.

Clarkson: Well, that was for standby service. There was always a standby that could take over when needed--that was typical back in the Iron Range long distance lines. They always had standby pumps.
[KNOCK ON DOOR]

Come in.

[tape interruption]

Swent: I thought it was more than just having them for standby. Instead of having them in relays along the--

Clarkson: No. Some of them--a real long distance had relay pumps. We didn't have that requirement. But we studied that because one of the studies was to determine the type of haulage from the pit to the mill. In that it was uphill, that was part of the pumping study because there was a consideration of locating the primary grinding, the rod mill, at the crushing plant and then pumping the slurry from the rod mill up to the ball mill section at the concentrator.

The other one in that research was whether to use rail haulage or truck haulage. Well, truck haulage was the final selection. The reason rail was being considered was because there was some good mine rail systems somewhere--I don't remember where--that was for sale. It was being phased out in favor of truck hauling, and it could have been purchased at virtually a scrap price. In that case we had the electric power available for rail haulage, so it was weighed and turned down, and the pumping of a slurry was turned down, too.

But we still continued to have the problem of pumping the mill tailing upstream.

Swent: Tires were a problem during the war? Tires for the trucks?

Clarkson: Yes, yes. For pumps and mill parts, too. For flotation parts and rubber-lined pumps. Sometimes we had a lot of problem because the only thing we could get [were] synthetics, neoprene, that wasn't good at all for abrasion resistance. So tires--but we, Stibnite, had the highest priority to get good quality. But sometimes even the good quality was not available and so we had to have our own tire shop on the job because there had to be a lot of tire repair, struggling to keep trucks running.

Swent: What were your conveyor belts made of?

Clarkson: They were rubber, but they were all pre-war. The Shasta conveyors were all pre-war conveyors. Very good shape, in all practical aspects. All of that equipment was just about as good as new. But also, like V-belts. With the shutdown of the Alaska-Juneau, where--there was a lot of maintenance items, like V- belts and electric motors, electrical equipment, we were able to bring from other Bradley operations, mainly Alaska-Juneau.

We got one ball mill from the old ghost town out here, Bodie. Bradley had an operation there. Bradley had a lot of activity in Nevada, too, with the mercury mines and different things. All of the cinnabar, mercury mines in California; some tungsten down in the desert area. {Spud Patch}

A Revolutionary Rod Mill Redesign: Installing Liner Lifters

Swent: What about the rod mill?

Clarkson: Well, the rod mill was new because one of that size had never been built before. It was built by Mine and Smelter Supply in Denver. Marcy [Mill].

Swent: How big was it?

Clarkson: It was nine feet six inches by twelve feet. And 450 horsepower. That's just a little tiny mill today.

Swent: It was big then.

Clarkson: Well, it was the largest that had ever been put on stream. And then Anaconda followed with one just like it, and then several more right in the same period. {1946-47} The original liner design that came with it was a failure--(a design for lower operating speed).

Swent: What do you mean when you say it was a failure?

Clarkson: Well, another thing that brought that out was we speeded up the mill to a higher speed {16.6 rpm} than a rod mill, for size, had ever been operated before, up to 80 percent of critical speed. And the purpose of that was to tumble the rods so the coarse feed, up to a 1 1/2-inch ring size feed, would enter the rods. With a slower speed, the rods just tumbled, and speeding

up--the purpose was to cascade the rods so that larger size of ore chunks would enter into the rods, rather than just laying on top of the rods, with the rods rolling underneath.

In the diameter of that mill, there were sixty waves that were just like a corrugated surface. It worked okay on the startup because the rods cascaded as expected and everything looked good, but the rods were also sliding over the ridge of the corrugation, and it wore them off quickly, in six weeks time, where we just had a smooth-bore mill, and the rods quit tumbling and therefore couldn't crush. The rod mass would just slide, and the rod charge was a 50-ton ineffective mass of rods.

So, really had a problem. Didn't even have a new set of liners on hand because it had been figured from previous experience that liners would last for six months or something like that, at least. So the liner plates were still two inches thick, but just with a smooth surface that quit functioning as required. So it was a scramble of brains what to do to avoid a disaster.

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Clarkson: So the great engineering heads got together and mulled the problem over and so forth and decided a good rectangular lifter bar in there might do the job, so I got right into the problem of what we could do. Then I checked the steel suppliers and found that I could get 1 1/2-inch-thick by 8-inch-width carbon steel bars in Portland. With the help of our design person {John Nicholson} and mill superintendent {Bob McRae}, we figured out how much of that material was needed in order to rush shipment of it from Portland and got the bars hauled into there and started work on it, taking the bolts out. We cut the bars to length for the rod mill and flame-cut the holes for the bolts and bolted these bars onto the liner plates. Same bolts that retained the liner plates.

There were originally sixty corrugations in the diameter of the mill. The sixty ridges each would be the equivalent of a bar. Next we cut that number down to forty in the next set of liners delivered from Marcy. That second set also failed; then came the bars.

Swent: They were stationary, then.

Clarkson: Yes. They were bolted in.

Swent: Instead of tumbling around.

Clarkson: Right on top of the smooth liner. It all worked beautifully with the carbon steel. That was not really an abrasion-resistant steel, but they didn't need to be because the rods would hang on the upside of the bar, lift them up and tumble them, and so that was the purpose that they served was really catching the rod in the depression, holding it straight, and lifting it. That led to a total new design for the next--and that had to be taken up with the foundry to cast that bar as an integral part of the liner plate.

Swent: You still used the fifty tons of rods. The number of rods didn't change?

Clarkson: Fifty tons of rod. Actually fifty-four tons a rod charge.

Swent: Sixty corrugations and fifty tons of rods.

Clarkson: Yes. Starting with the wave bar, we next cut it down to forty and then to twenty, which actually, I guess it was dumb luck or something. It was the ideal spacing for the speed, the rotation of the shell, the rod mill shell. So it made quite a revolutionary change in rod mill application.

Swent: And from then on?

Clarkson: The future mills just kept getting built bigger and bigger.

Swent: They continued to apply them that way from then on?

Clarkson: Yes.

Swent: Was this something that was patented?

Clarkson: No. Didn't see any commercial reason for patenting it. The foundries were just very pleased. One was EIMCO in Salt Lake [City], {Joe Rosenblatt},¹ their foundry. And also Mine and Smelter Supply, their foundry {MASCO} in Denver. {Of course Marcy people were called in at the outset of our problem.}

And then the next revolution in liner design after that was when rubber liners came into use. But I don't think rubber liners were applied to the big rod mills. That was a ball mill revolution.

¹Joseph Rosenblatt, EIMCO, Pioneer in Underground Mining Machinery and Process Equipment, 1926-1963, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1992.

Devising a Better Way to Lubricate Large Trunnion Bearings

Swent: That must have been pretty exciting.

Clarkson: Well, it was--(a relief). And there were other bugs that had to be handled in the larger mill. That was lubrication for the larger trunnion bearings. I can remember that; the bearings for that rod mill were five feet in diameter. We immediately ran into lubrication problems for them. {Another problem for the supplier too--MASCO--they were a benefactor of our experience.}

Swent: How did you solve them?

Clarkson: Well, it's a little story--with commercial power, why, the diesel plants were all shut down. We still had a big Ingersoll-Rand diesel generator. It was sitting idle. It had an oil-lubrication pumping system. It was a big engine, a big three-cylinder engine, that stood about fourteen feet high {chuckles}. There again, heads together to innovate. Let's get the oil filter, pumping filter system off the diesel engine and put it on the rod mill bearings. And that worked. The original lubrication that the company supplied was commonly used then, a brick lubricant that rode on top of the trunnion. The bearing rubbed the grease off. It was like a big stick of oleomargarine, a block of this lubricant that sat on top of the surface and kept--as the surface warmed up, why, it would wipe off more of the grease. That was the lubricating cycle.

The change from--the diesel engine oil system pumped a stream of filtered oil right on top of the trunnion surface, fed oil to it constantly and also it had its cooling effect. It worked beautifully. But we had to jack up and re-scrape--with that failure, we had to jack the mill up without the rod charge in it, re-scrape the bearings, and get them {blued in} refitted so that they had a good surface contact.

Another headache was eliminated. Anaconda had the same problem, so they came to us. What did you do? {chuckles} {Flew over to Butte to help them.}

Swent: So this was copied also by other people.

Clarkson: So they got oil-pumping filtering systems, using a suitable lubricating oil, and that's the way they took care of their mills. Those were interesting years.

Adapting a Tire to Control Pump Discharge

Swent: Any other things that you introduced or solved?

Clarkson: Well, oh, I don't know. A little innovation, like a pump discharge line, especially on this distribution system. The quartering a rubber tire, an auto size tire, depending on what size line. Putting it on the end of the pipe, clamping it onto the end of the discharge pipe was a handy way of controlling that discharge, breaking its velocity, the splashing and all of that, associated with a pipe shooting out--like a nozzle shooting out a stream of pulp. That was--fellows, mill operators, always had some good ideas. Little things like that, to make something work better.

Swent: How did you quarter the tire? I'm trying to figure it out.

Clarkson: Just cut it off. Take a 90-degree segment of the tire, a tire that fit the pipe size. A four-inch pipe, that took a smaller tire; six-inch pipe took a bigger tire. The stream coming out, the tire let it spread a little bit and broke the velocity of the flow as it was entering a tank, a conditioner tank or an agitating tank, also thickeners. It put the flow right where you wanted it to be, so to speak.

Swent: What a good idea.

Clarkson: There was always opportunity for innovation. And things like that happened with the trucks and with the shovels. The boss or foreman or an operator would come up with a way they could do something better, make life easier {and sometimes safer!}.

Supervisor of Smelter Construction

Swent: When did they decide to go into smelting, then?

Clarkson: That was to refine the antimony because the outlook and the hope was for antimony oxide, the various uses for it. The products that used antimony, like in paint and other uses, I guess even in some agricultural products. Because there was still antimony ore with the gold, a good, well-developed amount of gold sulfide ore that the smelters seemed to be--heap leaching hadn't come along yet, for recovering the gold from the oxide ore. And so some of the ore reserves that were left were of gold and antimony content. The future seemed to be

based on having a modern smelter, and a lot of research work had been done on that. It was also an all-electric smelter.

Swent: Did you work on the construction of that smelter?

Clarkson: I was the company supervisor of the smelter construction. That was a team responsibility. The electrical superintendent, Emmons Coleman, had a big hand in it. He was an electrical engineer.

Swent: There was a question of roasting the gold and cyaniding the calcine.

Clarkson: That was--roasting came in--again, it was roasted for the cyanide in the early {1930} days, cyanide process. But then, for the smelting operation, it was also roasted. That was the primary step in the smelting operation, was roasting the concentrates.

Swent: And you had to construct the roaster, then.

Clarkson: There were some changes in the flotation metallurgy for the new method, but the entire concentrate went to the smelter then. In that scheme of metallurgy, there wasn't any tungsten involved. The antimony was recovered as a fume, fume product in the baghouse. Then it was also refined. The gold came off as a dross in the refining, and the antimony came off as a granulated metal. The gold dross had to be shipped for final smelting in Salt Lake, or final refining. Did I make that clear?

Swent: Yes, I think so. Is that the same as a gold matte?

Clarkson: Yes. Well, the dross being skimmed off made the matte. But I didn't get into smelter work until we got up to that point--planning and design. Even though I--a lot of our activity--we got into the antimony smelter. See, Bunker Hill produced antimony and chromium. They had the zinc plant that followed the lead smelter. But lead metal and antimony metal both were produced at Kellogg from that ore, from the Kellogg {mine}.

Swent: But you didn't ship your concentrates to Bunker Hill.

Clarkson: No. Bunker Hill personnel assisted in the research and the design for the Stibnite smelter. {Also a consultant, Harold Menardi, that was manager of the El Segundo, California, antimony smelter during WWII--a war plant. Also he was the founder of a bag business--bags for fume collection systems--"bag houses."}

Learning from Climax to Retrieve Tramp Iron with a Dings Magnet

Swent: I see. Well, have we said all we should about the crusher and about the smelter? Was there anything particular about moving the ore bins and changing the direction of the conveyors?

Clarkson: Necessary to make more room for the pit expansion, the growth of the pit. Those unique features that had to be taken into consideration. I think it's all pretty well written up in some of the mining journals. But one thing was new and important: we got some expertise from Climax, was grabbing the tramp iron, like drill bits and other tramp, after the primary crusher, pulling it out--{off the belt ahead of the secondary, Symons, crusher.}

Swent: You used a big magnet?

Clarkson: Yes, with a big Dings. And that was relatively new in practice. A Dings suspended magnet {over the belt. Had to be strong pulling steel off a fast moving belt.}

Designing a 300-foot Conveyor to be at Maximum Slope

Clarkson: But another very important design requirement that was different from the conveyors at Shasta Dam was that we were putting these conveyor ways at a maximum speed and slope that we could run them without the ore sliding back on the belt, so that we went just as far as we felt that it was safe to go on the slope degree. {An overall design feature of crushing and bringing the ore up out of the pit to the truck haul bins.}

Well, the other thing, having a 300-foot conveyor belt on maximum slope, was in a power failure. If a loaded belt stopped, it had to be caught right there and held. Machinery would fly apart if that belt started back with a load of ore on it. Things would really fly because of the speed that it could attain, and all that would pile up at the bottom below the crusher and wreck that part of it, too. So the backstop brakes on the motors that would grab and hold just the instant that the power went off would prevent that happening, and that was one of the features that had to go into the engineering design of it.

Another little feature that had to be considered and planned, was the ore from the crusher going onto the belt.

Well, we designed the chute--some of this came from Climax--so that the ore coming out of the chute was sliding onto the belt from the crusher at nearly the same velocity the belt was running. Like this using a tire on the discharge of a pipe to break the velocity, the ore chute was designed so that the flow of ore coming out landed on the belt in the same direction that the belt was running. If you put a chute--just like sometimes we did on slower-speed belts, with it going on there, the ore just dropped on and then the belt had to get it into motion--why, that could be a real wear problem on the belt. Those were all that had any experience--talked about and decided what to do. So that was a historic development in conveying the ore up out of the pit, rather than trucking it out.

Swent: We should talk about some of the people, too. You mentioned Tony Mecia. You haven't mentioned Bud Wilson.¹

Clarkson: Bud was a latecomer {after WWII}. And I talked about Beverlee and having the need for another schoolteacher. But Bud did get in on the engineering and smelter work. Rather than overall mine work here, he was involved in process. I think about the time that we left, he was a shift foreman in the smelter, so his last experience there was in the smelting operation.

Swent: You became friends there?

Clarkson: Yes we did, and like with other Stibnite people, our friendship has lasted through the years. Bud started in the engineering department and of course I required the assistance of the engineers during construction of the crusher and moving the ore bins. That's where Bud started doing the survey work for the new bench site and such for the new ore bin and conveyor.

On top of that, Beverlee also was pregnant during that first year of teaching school, and they were nearby neighbors. Their house--when they got into a house. They first had to live in Yellow Pine because there wasn't a house available in Stibnite. That was one of Bud's concerns because the chief engineer promised him a house, but when they arrived, they didn't have a house--none available [chuckles]. Then, when they did get a house, why, it was just down the hill a little way from our house.

¹Alexander Wilson, interview in process, 1999.

Bev was not one of our kid's teachers. But when Shelley, their oldest girl, came along, Claudia was oftentimes a babysitter and Edna was sometimes a second mother!

Recreation at Stibnite: Recreation Hall and School

Swent: What were you doing for recreation in Stibnite? Were there still card playing and dancing?

Clarkson: Oh, yes. Well, the recreation hall was the center of that. Outdoor--the big thing was the annual barbecue at the end of summer--Labor Day--when employees invited their guests and usually the state governor came in and other people associated with the company. So that was a big annual event.

But other--put on some drama because the recreation hall was an excellent facility for it. Then activities with the kids. Boy Scouts, Girl Scouts. And involvement in school activities.

Swent: Let's talk about your school involvement.

Clarkson: I'll have to show you this picture [showing picture]. Once I flew Santa Claus into Stibnite.

Swent: This was 1947, and you've got Santa Claus in the plane. You brought him from the North Pole, did you?

Clarkson: Oh yes. And he almost got airsick.

Swent: Uh-oh! [laughter]

Clarkson: Right at that point, when that picture was taken, he was kind of pale. But he made it. He hung onto it. As soon as he got out of the plane, got his feet on the ground, why, he was okay.

Swent: Where did you pick him up?

Clarkson: Well, right there. The kids--they were coming to the store. Edna's brother was the store manager, and he was putting on a party for the kids. Well, I picked up Santa Claus. He was one of the fellows that--"Rosy" Rodriguez was his name. Rosy-cheeked and kind of pudgy. Made a good Santa Claus. But to use up a little time, after the kids came--we took off before the kids started arriving from school, the school down a ways

{at the village center--service station, rec. hall, school house, laundry and hospital}.

I said to Rosy, "Let's go fly over to Thunder Mountain," to check on an old prospector that we checked up on periodically. We called him Frenchie. He had a French-Italian-type name. And so I flew over and down over his cabin, to see whether there was any smoke coming out of his chimney. There was smoke, all right, coming out of the chimney, but going over the ridge and dropping down and circling around was a period of maybe a half hour, away from Stibnite. I pulled back up and then dropped down again to land at Stibnite. Why, it started grabbing Rosy [laughs]. He started getting airsick. But it didn't happen; he held it. But he was in pain, just all ready to let it go when we landed. {The cold air helped!}

And this little plane, an air coupe, belonged to one of my machinists in the mill machine shop. It was almost a brand-new plane. I flew it a lot, giving him some instruction and things like that. I had the use of it whenever I wanted to fly it. So I took Santa Claus in that plane. It was pretty suitable for the occasion.

Swent: You were mayor at that time.

Clarkson: Yes.

Swent: It says in the picture.

Clarkson: That was fun. I was involved in just about everything.

Swent: You were elected by the townspeople?

Clarkson: Yes, by the village board.

The School Board and School Consolidation

Swent: How did you come to be on the school board? Were you appointed or were you elected for that?

Clarkson: I was appointed.

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Swent: You were talking about the school board.

Clarkson: The school superintendent in the county made regular trips to inspect and check the teachers and the curriculum and all of that, and then whenever there was a vacancy on the school board, why, a new member had to be appointed. Well, my turn came up, so there I was. I was on the local school board when the school reorganization plan came along.

Swent: Was this a state plan?

Clarkson: It was general, but it was a state plan following a national school reorganization plan. Areas that had lots of one-room schoolhouses, pretty much all over the West, especially the Northwest. So I was on that until I resigned when we moved out.

Swent: How did this change the school setup? What did reorganization mean?

Clarkson: It meant that all the country--the one-room schoolhouses had to be closed, and the county had to start keeping--in snow country, had to start keeping county roads plowed out into the rural areas and also start running buses to pick up the school kids because the claim was that a central school could operate more efficiently; the teachers would be better; there would be more to offer. The criteria for high school then became a hundred-classroom unit, and we couldn't qualify any more in Stibnite for a hundred-classroom unit, so the Stibnite high school was discontinued.

But they had to maintain a grade school in the Yellow Pine village because they couldn't transport the kids eighty miles to Cascade or McCall, to the nearest school, so that a one-room schoolhouse was retained--but out in the valley areas--Cascade, McCall areas--which was the major populated area, then they had the central schools. And then they had to start busing within the range of those schools.

Swent: But the school at Yellow Pine continued.

Clarkson: Yes, it continued.

Swent: All the way through high school?

Clarkson: No, no. Just the one-room school.

Swent: Through eighth grade.

Clarkson: Yes, through eighth grade. It required a total of eight students to still maintain the school. Yellow Pine at times

had to scramble to have enough kids. This was after we left, of course. But they hired a school teacher with kids.

Swent: When you were there, what did the high school students do? They had to go off to--

Clarkson: Oh, no. We had this recreation hall, and we had classroom space--suitable rooms.

Swent: That's what I thought you said, that you had high school there.

Clarkson: Yes. Also we had the indoor athletic facilities and everything to maintain a high school.

Swent: Through twelfth grade.

Clarkson: Yes, in the recreation hall right alongside the elementary school. {Generally called the rec. hall!} School continued to eight grades. But at the very last, we didn't have to send Curt out, but we had to send Claudia out to start high school in Boise. That was one of the reasons--besides starting the company, Clarkson Company, getting that going, and the kids starting into high school--that was one of our incentives for getting established out in Boise and finally on to Palo Alto.

We had to send Claudia out for her to live in Boise for her first year of high school. {With the school reorganization plan, grades 9 to 12 had to be dropped at Stibnite.}

Swent: Did she stay with friends? Or was there a boarding arrangement?

Clarkson: No. She first stayed with my sister that was living in Boise. She stayed with my sister to start, but my sister had a houseful [laughs] of her own kids, too. {So in time we found another place for her until we moved to Boise--1951.}

Swent: Another thing that we didn't mention that we should is the storm of February '49, the big blizzard.

Clarkson: Oh, well, it was the big snow year. That was the year that the Air National Guard all over the Northwest had to come into play because northern Nevada and Montana and Wyoming--they used the Fairchild box cars to haul baled hay and drop it out to herds of sheep and cattle that were trapped out in the snow, and isolated horses, things like that.

Swent: What about you there in Stibnite? How did it affect you?

Clarkson: Well, snow slides. There was dozens of snow slides that closed the road for a period of three weeks, so the Air National Guard there, in Boise, felt they needed a little experience so they decided that Stibnite would be a good practice run. We were pretty capable of taking care of ourselves, along with the county and company getting the roads open again and snow slides plowed out. No one was lost or killed. So it was kind of a laughing matter about the way the National Guard performed [laughs] on that. That was some of the entertainment that we had during that period. {One of the Bradley Field pilots, Les Randolph, rode along in a Guard DC-3 to direct their food drop by parachute.}

Swent: They rescued you [laughs], but you didn't know you needed rescuing?

Clarkson: That was kind of it. They made a pretty big thing out of things that we were pretty much used to. [going through papers] Let's see if I have any--

Swent: You did have a picture of the National Guard dropping food on parachutes for you.

Clarkson: I thought I had some pictures of some of the snow slides.

Swent: You had plenty of earth-moving equipment to get a snow slide shoved out of the way, didn't you?

Clarkson: Oh, yes, yes. Company crews worked from our side; the county worked in from the other side, from Cascade--{with dozers and snowplows}.

Swent: That's another thing we didn't mention on the crusher, the necessity to have everything heated. That was kind of special, that you had to heat everything in the crusher.

Clarkson: Yes. Well, we had boilers for that. It was either hot water or steam systems that--the big boiler for all the--the new smelter, a lot of heat came from the smelter. But the mill and crusher buildings had boiler heat with space heater fans in the building. In later years, we also--in all the buildings, they were all frame construction--we also put in automatic sprinkler systems for fire protection.

Three Disastrous Fires

Clarkson: We had to deal with several fires at different times that were real problems, too. One was--the original Ima Mill burned, and a new one was replaced on that. In Stibnite the primary crusher at the pit had a fire. Started one night, apparently from an electrical cord, and burned the crusher, so there was a crash program to get that rebuilt. My department had all of that. Fortunately, the mine had a stockpile of crushed ore that--we turned the rebuilt crusher over the day they shoveled up the last load [laughs] of the crushed ore--that was just in a month's time, thirty days, that was accomplished.

And then the warehouse burned in Cascade, the shipping warehouse at the railroad track. Sometimes we had forest fire threats there, too. But the crusher fire, the Ima Mine fire, warehouse fire--transfer warehouse at Cascade burned. As usual, things like that happened at a pretty inappropriate time of the year [laughs], too.

Swent: Always.

Clarkson: All the help needed would be turned to handling the problems. That's the way it happened.

Kellogg Krebs

Swent: How did you meet Kelly Krebs?

Clarkson: That started with the reagent feeder in 1935 because he was a Cyanamid man that was serving the Grass Valley area. That was 1935. I didn't bring that with me. I have a letter about that meeting and the feeder, when I got Cyanamid interested in--

Swent: Yes, I think--

Clarkson: I think I showed it to you.

Swent: Yes, you did. I thought you even gave me--maybe you didn't give me a copy, but I saw it.

Clarkson: Because they were just introducing the Fagergren flotation machine. They had taken it over. So every job that I was on had Fagergren flotation machines {and Clarkson feeders}. I became a part of that scheme. And so that always kept me in

contact with Kelly Krebs and other Cyanamid fellows, like Otto Brown.

Swent: How did the idea come up for forming your company?

Clarkson: Well, World War II, Kelly was then involved in--he was involved, but he wasn't the manager of Cyanamid's poison gas plant, mustard gas, in Azusa [California]. Late in that period, he had a heart attack. It was pretty severe. And then, when the war was over and Cyanamid was phasing that out, they offered him a transfer to go back to Stamford, Connecticut, to the headquarters facility. He had been off the job for quite a long time because of his heart problem. His doctor told him then that if he went back there, he probably wouldn't last very long.

But he was in New York at the time to consider the move, when coming back from New York he wrote a letter to me asking, proposing that he would like to talk to me, if we could meet in San Francisco. This was in December of 1949. I made pretty frequent trips to Bradleys' San Francisco office, and I said, "Well, that could be easily arranged. I'll be making a trip"--which I did to San Francisco that December. And we got together.

Well, in the meantime, I had gotten notice from Cyanamid that they were selling the Fagergren flotation business to Wemco. Of course, I knew Wemco, too. Whether Kelly knew that or not, about their contacting me--the Cyanamid manager in the Azusa area was the one that notified me. Then Wemco assumed that the feeder came along with the flotation machines, but Cyanamid asked me if that was agreeable for Wemco to also acquire the feeder.

When I met with Kelly, he told me his circumstances with his heart problems and all. He said he would like to start a consulting business in San Francisco and move to the Bay Area. There was Hamilton, Beauchamp, & Woodworth there, and he had made some arrangement there that he could get an office room with Hamilton, Beauchamp, & Woodworth. He asked me for my thoughts about if he could manage the feeder sales. He said he thought we could get the feeder inventory for a pretty reasonable price and everything and did I want to take it over. {He also indicated that there was some very good orders pending.}

That sounded like a pretty good idea to me, that we'd have a San Francisco sales office. I would take all the feeder equipment, the production equipment and the inventory to Boise,

where I could still work for Bradleys, and manage it from there. So in January we indicated our desire to set up a partnership.

V DEVELOPMENT OF THE CLARKSON COMPANY FROM 1950 AND SPECIALTY VALVES

January, 1950, Setting up the Partnership

Swent: This is January of 1950?

Clarkson: In 1950. So we set up the partnership in January, 1950. Jack Bradley told me I could take the company plane. I flew down to Azusa and visited Cyanamid and all the fellows--the fellow, Joe Alcock, was the head of the manufacture of the Fag cells and the Clarkson feeder and some other items. He showed me what they had there, and we got the existing orders that hadn't been delivered, the inventory and the tooling. I had it all boxed up and shipped to Bradley Field in Boise. I used a room--got a room that had been the radio room in the Bradley main hangar for our first production of the Clarkson feeder.

Swent: What was the inventory at that point? How many did they have?

Clarkson: Well, there was orders on hand by then for over a hundred feeders. It was a pretty sizable inventory. But the feeder being small, dimension-wise, was easy to move.

Swent: But still, it was a good, going business.

Clarkson: Yes. It was a good, going business. Bread and butter {and to buy needed shop tools}. Kelly was--what his plan was, to set up a metallurgy consulting business for himself, but that never materialized [laughs]. His doctor's advice was that he could do something, but not to spend more than four hours a day. Well, he got his family moved from Azusa up to Palo Alto in that period, and he was commuting on the train up to the office and spent a few hours each day in the office. In the notes, he said, well, the consulting business is pretty lean [chuckles]. He talked about things that were in the offing that he was beating the bushes for.

But I still had my job with Bradleys, and then I hired one fellow that I long time knew. He was a good machinist. So he took charge of the assembly work and the little bit of machine work that had to be done, and the inventory and all that. He did an excellent job, so I would come out from Stibnite periodically.

Swent: What was his name?

Clarkson: Stan Bybee. He worked with us until he got married. He was a single man through all of that period. After we moved to Palo Alto, he met a schoolteacher that was a widow lady. That turned out to be a nice match. They got married, and for their honeymoon, took a trip to Alaska. He liked it so well--they both did--they decided to try a new environment, so he quit his job with Clarkson Company, and they moved to Alaska. She got a job teaching school in Anchorage. And he got a job on the DEW [Distant Early Warning] line, the communications--they've both passed away now. They retired from Alaska. They came back down to Sweet Home, Oregon, and they both passed away during their retirement years there.

Adding the Centriclone to the Good, Going Business

Swent: What about this hydrocyclone?

Clarkson: That came along soon after, in 1952. The fellow that had a patent {Norris Goodwin} was a mechanical engineer in San Francisco. Kelly came on to him. The patent was on the so-called centriclone. It was a hydrocyclone that was powered. It had an impeller in it to set up the velocity, so of course had to be motor-powered. Clarkson Company was going good by then; we were real busy with good orders and everything. {And I was eager to take it on--right down my alley.}

Swent: Just for feeders.

Clarkson: Yes, just feeders. That was all we had. Of course, I wasn't taking any salary. We both put in so much money when we set up the partnership. We both made an equal contribution for working capital, to be exact, \$15,000 from each one of us. So we started out with the feeder and \$30,000 of working capital. But the only pay was some to a part-time secretary with Hamilton, Beauchamp, & Woodworth, and Stan Bybee, full-time in Boise.

Swent: You had to buy it from Cyanamid, though.

Clarkson: We had to pay off the--but that was over a period of time. It wasn't a one-time deal. I think there was about \$60,000 of inventory. Tooling was mostly depreciated, so about all that they required that we pay for really was the inventory. That was all paid off by existing orders in a period of time.

Then the centriclone, that's what led--the centriclone led to the hydrocyclone development. That was brought about--we in turn got some cash out of. We licensed it to the American Cyanamid Company for phosphate in Florida. We would build them for their phosphate system.

And the other was for Oliver Filters in Oakland, for the food and chemical industry. That was a \$20,000 deal with Oliver, with \$10,000 to be paid from production. They did a lot of--they had the facilities to do quite a lot of research and testing on the application of centriclone, and they liked it. Then before we moved from Boise, I started doing the mechanical and assembly work and took over shipping from Boise. That started to seem real awkward, so that precipitated our early move to Palo Alto so we could [chuckles] get our act together.

Then, at that point--I don't remember the date--we decided that it was a good time to incorporate, so we incorporated under the name of Equipment Engineers, with Clarkson Company a division.

Moving the Plant from Boise to Palo Alto, 1952

Swent: You moved to Palo Alto in '52.

Clarkson: Yes. And I moved all our production work from Boise to Palo Alto.

Swent: And at that time, you were producing both things here--the feeder and--not here, but in Idaho.

Clarkson: And the centriclone--just starting. {Norris Goodwin patent.}

Swent: The feeder and the centriclone in Idaho. And then you moved to Palo Alto in '52--{in time to get Claudia and Curt started in school}.

Clarkson: Yes.

Swent: But you kept your office in San Francisco for a while?

Clarkson: Oh, yes. Almost up until the time we separated, split off.

Swent: But your production and--

Clarkson: All the production was in the plant.

Swent: Palo Alto.

Clarkson: Yes. What the San Francisco office--that's where Kelly was, and also Art Norman. {And, of course, Miss Grace Brown.}

Swent: Was Norman your sales manager?

Clarkson: He became sales manager for Clarkson, that is, handling all the business that came into the Clarkson Company. Then the centriclone was all under Equipment Engineers, and then they later changed it to Krebs. Actually the change to Krebs Engineers didn't come until after we split off.

Splitting the Company: Clarkson Company Becomes Independent

Swent: What made you decide to split?

Clarkson: Well, that story--some of it was the brother, Dick Krebs--there was an area of jealousy that crept up from time to time that he, even though, along with his brother Kelly, why, they felt that Clarkson should again be a separate company, they wanted--because of the Krebs name was attached to the cyclone, the resentment there was very oftentimes out in the field, where it got called a Clarkson cyclone--dubbed a "Clarkcone". The name that got used by people out in the field that knew me and the feeder--well, and knew Krebs, too--called it a Clarkcone [chuckles]. The younger brother, Dick, didn't like that. He wanted the Krebs name to be more recognized.

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Swent: So it was the Krebs hydrocyclone and the Clarkson reagent feeder.

Clarkson: Yes, that's the way it was. But another thing--this should be off because I don't like to be petty.

Swent: Do you want me to turn this off?

Clarkson: Okay.

[tape interruption]

Swent: Anyway, his brother worked, you said, for Oliver filters.
{Prior to that he was mill superintendent at the Idaho-Maryland Mines.}

Clarkson: His brother--and Kelly was a big part in that--they had formed a corporation called Mineral Process Engineers Inc. The third fellow that was involved was Harold "Tiny" Lynn. He had been mine superintendent during the thirties at the Idaho-Maryland. He was a Stanford fellow. He was a friend too because I first got to know him when I worked for the Idaho-Maryland, and there was always some contact over the years. He invested in their corporation, too, on a patent that Dick Krebs had in his name, on a carbon gold recovery process. It was carbon extraction of gold and then the usual, see?

Well, in the period (late forties) that they were trying to get that developed, he was licensing his process to different gold companies and also a San Francisco company that manufactured cyanide filter presses and pumps and so forth. The Merrill-Crowe Company, which was the Merrill Company. They manufactured Kimball Crowe pumps and filter presses. The entire equipment chain for cyanide mills. They were licensed for the Krebs carbon extraction process when used with other K.C. equipment.

Another one of the licensees was the Golden Cycle Company in Colorado. Then supposedly other licensees coming in. Well, there was no money paid to Mineral Process Engineering for Dick's third leg in the partnership. He came in with the strength of his carbon patent, which supposedly became owned by Equipment Engineers for his share. Well, all of these licenses died. There was no income from any of them.

The next thing I checked with the California secretary of state, and the corporation was nonexistent any more. It was gone. So then I didn't make a problem out of it, but once in a while I would comment on the way Dick came in. Well, that's where--I had magazine, trade journal [articles], like Stibnite accomplishments, and every once in a while Dick would show a little resentment at my end because the feeder--my name was lots better known in the industry than his. It was kind of a little brother attitude that came across that way.

Well, I think in Kelly's last years he felt that this should be separated, thus resolved, so started to say maybe the Clarkson Company would like to be on its own. So it led up to our separation and dividing our assets and so forth. But Clarkson Company still continued to do the machine work for Equipment Engineers because they built a building right alongside, so until they got on their feet with the cyclones--actually manufacturing them--we continued to machine the parts.

Well, in that period of the windup Kelly died and then his brother. Both died of heart attacks. So then Art Norman, he had stayed with Equipment Engineers and became president until his retirement. After Art died, I wrote an appreciation for him for *Mining Engineering* and so forth. There was no--he was very loyal to the Krebs, but I never let anything get in the way of our friendship. In the long run it was for the best. My reward is that Clarkson Company has really succeeded by developing new products and hiring exceptional management people. Curt, even before we moved to Boise, he loved to get out of school on the weekend and go down and help work with Stan. He was very fond of Stan Bybee. Even after we moved to Palo Alto, Curt would work at the shop. In later years, we even brought Curt's classmates in for summer jobs.

One time Kelly gave Curt a lecture, telling him not to get too involved, that it wasn't something for him to be doing. So there was a little--and the brother Dick would sometimes take little digs at--because I would hire for summer jobs kids that were Curt's school friends to work the jobs down there. Dick and Kelly had children, but the children don't have any part in the management present-day--or at any time during the Krebs operation.

So all those years I always leaned over backwards not to rock the boat. But you understand when you get two of a family in something and then you are the third--

Swent: Odd man out.

Clarkson: You've got to deal with some things like that. So that led up to the separation. It was for the best. It wasn't until the last--not the last, but one of the later presidents of Krebs pursued getting back together. He looked at Curt as being the ideal leader for a company going back together again. But we finally turned all of that down. But I don't like to put pettiness in sometime. I prefer staying above such.

Swent: No, but it's part of the history. And you do need to know why when a company separates like that.

You moved in Palo Alto; you were next to Krebs and then you moved. Was that later?

Clarkson: Krebs moved from alongside of us to Menlo Park. They had a new building built in Bohannon Park, and they then sold their building that was next-door to us in Palo Alto (Bohannon Industrial Park).

Swent: And then you also moved.

Clarkson: Yes. Well, following that period, we were zoned out, and finally had to move. They rezoned that area of south Palo Alto from light industrial to residential, single- and multiple-home residential area. And so I acquired land out on the frontage road, and we built a new building. We needed more space, too. Our old facility that we started with didn't have any parking space at all. In those days, we didn't need it. Street parking was adequate. And the city didn't require a business building to have so much parking space along with it.

Swent: How much fabricating were you doing at that time?

Clarkson: We jobbed out a lot of specialty work and some fabricating work and so forth--foundry and rubber molding too.

Swent: You were doing mostly assembly?

Clarkson: No, a lot of the machine work. But items like the feeder, all of the stainless steel work and the foundry work, all of that had to go out to special suppliers, so the machine work that we could do, the heavy work, some fabricating and associated work --so it was always a combination of outside--the rubber molding, too. That was all--Krebs never did go into rubber molding, nor fabrication. Now all of that--they did machine work--when they started their own machine work, that was done in-house. But very little fabricating work.

In our early days of the centriclone, in Palo Alto, there was a custom machine shop {Nick Martinsen's} just a few blocks away from us. It was first a one-man, two-man operation. So I set up some of our work with him {Nick Martinsen's shop}. Well, then, in later years, when Nick went out of business {retired}, when Krebs was starting on their own {1960s}, why, they bought his machine shop equipment, and that was the beginning of their doing their own in-house work because the machine shop owner retired and liquidated his business.

Adapting the Sala Constricting Valve and Declining to Patent It

Swent: How did your business grow?

Clarkson: Well, sometimes it was a struggle. The feeder business was good, but there were up and down periods in it. The patents, except for one, on the valves, were all in my name. One valve patent I declined to have my name on it when we were still together because Kelly had found a constricting valve, that a Swedish company, Sala, was manufacturing--

Swent: Sala?

Clarkson: It's a town in Sweden as well as was the name of the company. It was one of the historical silver mine sites in Sweden, going back to the fourteenth century. Underground, high-grade silver. It was Sala's mine. It's a Swedish national historical mine site now. You can go down into the old mine. The occurrence is in sandstone. High-grade silver. Mined before dynamite was invented, they built fires to chip the rock. They had to design it so they had ventilation. They built a fire against the ore; then they would crack it off from the heat, and that's the way they developed this underground mine. Well, now it's a historic site. That mining was, as I say, going back to the fourteenth century. Now you can go down into the mine. It's very interesting.

Swent: You've been there.

Clarkson: I've been there. {1968} Then the Sala Company in later years came down through family and in late years, in the mechanical age, they had a foundry shop and a brickworks. Still family, but it was still just a little foundry when the president, the Swede {Edvin Johanson} that became a good friend of ours developed the foundry into a manufacturing company, and then an international company known as the Sala.

Well, he got a lot of his work from his association with the Boliden Mining Company. After we started our company, he wanted us to take over the license for the Boliden flotation machine in the U.S. and Canada. They hadn't really been introduced in this country, but Kelly's flotation experience and mine on the operating side, we decided that flotation machines were too much of a feast or famine. You could get one big job and then maybe not get another job for a couple of years or so, so we--

But from then on, I worked with Edvin, and he brought this constricting valve to our attention that had been developed at the Boliden mine. Well, it was just the housing with a chunk of rubber in it that could be squeezed down hydraulically to make a ventura-like closure for flow control, not a full shut-off valve. We got some of them. Kelly handled all of that. A bunch of them were bought to use as an apex valve on the hydrocyclone.

[tape interruption]

Swent: You put it on the apex--

Clarkson: Of the cyclone, to control the underflow of the cyclone. They hadn't really found a good application. The only area that they had used it in was on thickener underflow. Diaphragm pumps were commonly used for that, or just--if they didn't use a pump, they used an orifice plate. The orifice plate could only be adjusted by changing it. That was an application for it. Well, Edvin thought with our cyclones that was a great opportunity.

We got this shipment of valves to use on a number of cyclones that we had the orders for. Kelly had nameplates made for them and called it the Krebs valve. I redesigned, made a few changes in it for a larger size, and Edvin Johanson found out that the Sala name was not kept on the ones purchased, and he was really upset about it. He had good reason to be!

Well, then he understood the problems with the single rubber bushing in it because the pulp could leak around and ruin the valve real easily. So I redesigned the shape of the housing and rubber part some, and Kelly applied for a patent on it in his name. I had, of course, all of my redesign work on it. I declined to have my name on it because I said this is still a Sala valve. There was a Swedish patent on it, under the Boliden name. And so Kelly went ahead with the patent, and it was U.S. patented as a Krebs valve, known as the K-valve.

Patenting the First C-Valve

Clarkson: And so by then I knew the weaknesses of that design, so I designed an entirely new valve with a sleeve, just a regular sleeve in it, and then a rubber surrounding it, that we called the muscle. Well, the muscle had a good seal around it, and the muscle was hydraulically pressured to squeeze down the

sleeve--it operated beautifully and eliminated the problem of pulp leaking around and filling the hydraulic cavity. We were still together then, but then I allowed that patent to be applied for--then worked with a San Francisco patent attorney, and it was subsequently patented as the Clarkson C-valve. Sala was allowed to manufacture and sell the C-valve in Sweden without royalty to Clarkson.

Swent: Was that the first one?

Clarkson: That was the first one in my name. And that's the one that we continue to manufacture today. Little things like that that I was very careful about because, as I say, I still didn't--I always felt that in a partnership sometimes you have to lean over backwards to avoid conflict problems, and so I worked pretty hard, trying to keep things like that on a straightforward basis.

Swent: Well, your valve has certainly been successful!

Clarkson: I don't attribute it all to my efforts. I've had fortunately good people, a good son and others that--in the Krebs family there was two boys--the boys were all in Dick's family. Kelly and his wife only had an adopted daughter. None of them were really interested in the business or had the desire, you might say, to carry on.

International Business Right from the Beginning

Swent: So your business has now expanded, of course, into a good international business. But at first it was primarily in the West here?

Clarkson: Well, international was a part of it right from the beginning because Cyanamid sold--they were an international company, and feeders were being sold in mining areas all over the world.

Swent: Even when you first took it over.

Clarkson: When we took it over. I had a big shipment that went out of Boise {1950} for South America. Antofagasta. And shipments going to South Africa. So right from the beginning we were into international. But it was all in mining, the minerals industry.

Swent: Did you have to set up representatives in each of these places, then?

Clarkson: Everything was direct marketing {some OEM} until we--I didn't set up a rep[resentative] organization until after we separated, and Krebs never--they didn't go into having reps until after Clarkson did. In the beginning, it was the engineering companies--Bechtel, Kaiser, the Galigher Company and different ones--quite a few of the companies that I had been on the buyer's side. Mine and Smelter Supply, Galigher. They were all people that I had business with. Denver Equipment Company. And Cyanamid, too. Because I had a number of friends in Cyanamid other than Kelly. {One especially, Otto Brown, known as a millman's millman.}

So all of that. As you know, like you, you went from U.S. jobs to foreign jobs, Mexico and different places. I was fortunate that I had acquaintances, one way or another. Like at the Indian Valley development. There, because of the real hard ore that we were faced with in the Standart Mine--we were one of the first to use a Kue Ken crusher. That was an Oakland company that manufactured crushers and concentrating tables and so forth. And we had some problems with it.

We also had some gouge clay in the crusher because it was not an oscillating crusher; it was a direct-motion crusher, so it caused--when the clay compacted in there, it was uncrushable and that damaged the crusher. Well, they had some South African inquiries. They did quite a lot of trade journal advertising. The earlier crushers and tables, process equipment, was pretty well known. So they sent--I had solved the problem at Indian Valley. They sent the inquiries to me. They asked for me to say what I had done to solve the problem. So I got to know some South African people, and then when we started the Clarkson Company, we did have a South African company, kind of like Galigher, that sold the feeders in South Africa. But not as a rep. They were a machinery company-- {Fraser and Chalmers--thus an OEM}.

And that's the way most of our sales were, in the beginning, like in Canada. Nelson Machinery Company. They dealt in used and repaired, some used mining equipment, like Wemco did in the early--well, they sold the feeder. They would buy back feeders if a mill was shut down, liquidated and so forth. That's the way our first sales were all handled. Eastern Canada, a machinery company there, Technequip. And I got to know the fellow that had started it. He had been a principal in the Milton Roy proportioning pump company.

Swent: What was the name?

Clarkson: Milton Roy. They built proportioning pumps for different use--mainly for oil, measuring oil into machinery, like steam engines and air compressors like that. And so he was interested in selling our feeders. But we already had a market there. So they would buy feeders and then resell them. They'd have them in stock.

The way with the company in South Africa, they would stock, but on a big order, why, they would send it to us for direct shipment. But they always stocked some, too.

It was that way in South America to some extent. But those feeders--when we started the business, Cyanamid had sold feeders all over, already. And the name Clarkson by that time was pretty well known.

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Swent: You were talking about how your company grew. You continued with the feeders and the C-valve. {1960} Now we've got the C-valve, and you had people around the world that you already knew.

Clarkson: I think we got in there too with the hydrocyclone development. That's what led to the valve work was because of the need for valving on the cyclone.

Swent: I see. That's where you started getting more interested in valves.

Clarkson: All of it involves slurry work. So, in the split-off. The valve not only for the cyclone but having something to split. The valve came to me; the cyclone went to Krebs.

Swent: But they have to be used together, don't they?

Clarkson: Well, yes, but the cyclone--I designed a suitable apex valve for the cyclone. There was no patent or anything on that particular valve, so it went along as part of the cyclone. But it was just an efficient design, designed specifically for the cyclone, rather than using this heavy-structured line valve on the cyclone. What I had to carry on with was the C-valve, so that led to the other designs along the way.

Swent: But they're all slurry valves, is that right?

Clarkson: They're all slurry valves. The C-valve was the forerunner.

- Swent: And the special thing about them is that they work with slurries.
- Clarkson: Yes, especially for thickener underflow control and wet cement mills. They feed to cement slurry--lime slurry going to the kilns, cement kilns. And paper pulp found some uses. Wherever a modulated flow control could be automatically controlled. That, of course, was what led to other valve designs, all in slurry.
- Swent: And particularly--I understand they're also specially designed for corrosive and abrasive slurries.
- Clarkson: Those go together, abrasive and corrosive.
- Swent: Yes, but not all slurries are corrosive.
- Clarkson: No, no. But they do have--like in paper pulp. That's not very abrasive but very corrosive. And the various liquors that they use, caustic liquor, what they call white liquor and others in the processing of paper. But still it's solids in liquid.
- Swent: We mentioned that your business boomed a little bit with the uranium business.
- Clarkson: Yes, the uranium plants. But that was during the early cyclone years because the application was in the early days of cyclone, hydrocyclone classification.
- Swent: In the fifties.
- Clarkson: Then, after the split-off, why, then the uranium period was starting to change. But the C-valve, the constricting valve, still--it found quite a few places in the uranium mills.
- Swent: I was very much interested to see this file that Curt showed me earlier about the let-down valve for autoclaves because I've heard a good deal about that.
- Clarkson: Some of the first was Alcoa aluminum on their--that kind of an application. Myself, I never got very involved in--I didn't mention--I should have--in the sixties I came across a fellow in the Bay Area that was an instrument man. He was a sales manager type. He had quite a long career with an instrument company. {Minneapolis--Honeywell.} He was trying to get into a small company. I had gotten acquainted with him. He had made calls on us with his instrument job. {C. L. (Lee) Aplin.}

He wanted to be an entrepreneur, and he was trying to start a company of his own. He came to me for a little venture capital, which I put some into a company that was dying out. He wanted to revive it. It was a siren company in San Jose. Built fire sirens, police car sirens and so forth. In the course of that, why, I tried to help him in getting it revived.

He came up with an invention to go along with sirens that he was going to patent, of a belt with spikes in it that could be rolled up so it could be carried in a police car, so highway police--a highway block--they could throw this out, roll it out and the spikes would puncture the tires of a car. I think he did get the patent on it, but anyway, he couldn't make it with his company. By that time, I was pretty well acquainted with him. Because of his instrument background, I decided--he was interested--I hired him as a sales manager.

I had one engineer that had been hired to do some of this work, doing the valve engineering work. His name was Max Quigley. C. Leland Aplin is known as Lee. He was the first one that I had in what is today Hank's [Hank Frohlich] position. One of the first things I had Lee start on was to set up a rep organization, and he did a very good job of that. He searched them out, and he did a good job organizing sales people. And so he did a good job overall for us administering sales. He was just about up to retirement age when we moved over here and he resigned prior to our move.

And then we also hired another fellow, Dick Burmeister, in marketing and there was quite a bit of conflict, personality conflict between Dick and Lee. So when Lee resigned--he decided it was time--then Dick became marketing manager, and then he was replaced by Hank. A lot of the valve development and marketing and advertising, Lee had done a very good job.

Swent: Was he the instrument man?

Clarkson: Lee was the instrument man--(held a degree in electrical engineering). Dick was a mechanical engineer.

Swent: You said you had hired an engineer, and I wasn't sure whether he was the engineer or the instrument man. And then you had something called a knife-gate valve. Did that come along later?

Clarkson: Yes. My first knife-gate design was a tailings valve, especially for mill tailings. It was just built in two sizes. It was lever-operated, used on the spigots impounding mill tailing. Then I don't remember how many different--I think had

three patents and some foreign patents. At that point in time, that's when Curt grabbed the knife-gate valve design and really carried it on--and all of the later patents are in Curt's name. Curt really developed our present-day knife-gate valves from the starters that I had--so the knife-gate became our major line.

Swent: That's your major line now, the knife-gate?

Clarkson: Yes, a series of knife-gate valves.

Curt Clarkson, Son and Successor

Swent: I see. Now Curt: we haven't talked about Curt. He graduated from University of Arizona in 1962 and worked for Asarco at the Silverbell Mine.

Clarkson: Yes. And then he worked for--

Swent: He became a foreman, didn't he?

Clarkson: Yes. Well, he worked in two mills. He was shift foreman in Asarco Silverbell Mill and then he also worked in the other Asarco mill, Mission. The Mission Mill. With metallurgists there. {Wayne Brossard}

And then he went to work for Uncle Sam. He was drafted into the army. He was drafted, went through his basic [training] at Fort Ord, and then after his basic he went to Georgia. {Fort Stewart} Then he got a direct commission and he was sent to engineers school at Fort Belvoir, Virginia, and, I think, six months there. That was with the Big Red One, army division. And the 1st Engineers Battalion. After engineering school at Fort Belvoir, he was assigned to Company A, 1st Engineers Battalion. And when he was finished with the army, just before the Big Red One was sent to Vietnam, Curt was company commander of Company A of the 1st Engineers Battalion. Just by a hair, too, he missed out on the Bay of Pigs. He was ordered to be ready for that. Then he just finished up his time with the army, just in time to get out before the Big Red One went to Vietnam, so that was kind of nice.

Edna's brother, he was an army career man, he went all through Vietnam. Also Korea. First, to begin with, he was a draftee at the outset of World War II. He was in the first encounter in the Aleutian Islands and then he was all the way

through the Pacific theater until he was wounded on Kwajalein, right at the end of the war. But he lived through all of it. He retired as a lieutenant colonel. He lives in Woodland, California.

Curt's engineering stint in the army was finished, and then he went back to work at Asarco when he got out of the army. Then we decided it was time for the Clarkson Company. Norman Weiss headed up milling operations of Asarco at that time. He commented to me once; he said, "We're going to just get Curt trained and then you'll steal him from us." Which I did [laughs].

Swent: Which you did. He came into your company in 1967.

Clarkson: After he was out of the army {and a return to Asarco}.

Swent: And he became president in 1979, I think?

Clarkson: Yes, '79, before we moved over here.

Swent: I think this might be a good place to stop. We still have to have one more. Do you mind?

Clarkson: We've talked a lot about Clarkson and Krebs equipment and then Krebs.

Swent: There's a lot more left.

Clarkson: There's a lot more there. This one was supposed to be titled, "The Decade of Stibnite," but it's hard to keep from getting to other times.

Swent: It is. You can't keep it all in little boxes, can you?

[tape interruption]

Clarkson: I think that would be good in this because of my activities with Utah, setting up the first lab in Palo Alto and the fellows that I influenced bringing in.

Swent: We really haven't gotten into that at all.

Clarkson: No. Almost simultaneously--and we had a lot of talk about it-- Tony Mecia and his family--we both moved to Palo Alto in the same period. With Tony at that point starting to head up the mining division [of Utah Construction Company], none of these other people--like De Mosses and Wilsons and Wallaces and the Chinese fellow, Si Do Foo--they were, because of my close

friendship and work with Tony, we would discuss these different people. He would ask me about what I thought. Say, Ed De Moss would be a great guy for this problem, or Si Do Foo in the laboratory. Others--some that were Wemco, WKE, fellows that worked on the smelter and the Ima Mill that also--they didn't work for Bradley; they worked for WKE.

We were--the kids--we would be together a lot. Betty [Mecia] would call Edna, "Let's have dinner together." Tony and Betty bought their first house up in Los Altos Hills. It was a new house. Tony was non-mechanical [laughs] in every way, but he was a great person with people. So every time there was a mechanical problem, why, Tony hollered for help. So even to put up the first TV antenna, I went up to Los Altos Hills to help put it up. He was the first of the Stibnite bunch with Utah. I had some acquaintance with all the ones to come afterwards. So that's a pretty interesting story in itself.

Swent: Yes, it is.

Clarkson: Now, a tragedy, like the airplane accident. That changed the course--really, Tony's death is what projected Bud into the positions that he held. If Tony had lived and Homer Mann and the other fellow, Al Quine--Homer was not a Stibnite fellow, but he fit into the pattern very capably. There might have been a whole different pattern in all of the Utah--but Ed DeMoss was--after Tony, why, he was the next one to come in because--and he started--well, he and Tony were classmates at Stanford. That's some of the sequence in all these things.

[Interview 5: March 23, 1998] ##

Swent: We haven't interviewed now for a month, so there's been quite a little gap here. You've been in Florida at the SME [Society of Mining Engineers] meeting. One of the last things that we had talked about was when Curt had joined the company. That was in 1967. But I thought we might backtrack just a little bit and--

Clarkson: I don't remember how much we got into from the start of the company, while I was still working at Stibnite and we started the company. A trip that I made to Azusa to take over all of the feeder inventory and equipment and so forth. {Jack Bradley let me take the company plane to make the trip.}

Swent: I think we had covered that pretty well, Bob. I believe we have.

- Clarkson: And then the partnership and the incorporation under Equipment Engineers. I think we covered that.
- Swent: I think we did, and later, when you see the transcript, if you want to add more, then you can.
- Clarkson: My memory gets vague on what I said and when I said it. {Short term memory!>}
- Swent: I know it. It's hard, and I'm sorry that we don't have the transcript yet for you to look at.
- Clarkson: That would have helped. But we'll try to catch up the loose ends.

Naming and Patenting the Valves

- Swent: We haven't talked much about the patents. I noticed that your first patent was given to you in 1963.
- Clarkson: Yes.
- Swent: And that was for which valve?
- Clarkson: The C-valve.
- Swent: The basic C-valve.
- Clarkson: Yes. That's the constricting type of rubber-lined valve.
- Swent: And it was called C-valve for constricting? Is that the significance of it?
- Clarkson: It started our alphabetical list, the C. That was part of it, that it was a constricting valve, or peristaltic type.
- Swent: I've heard that word as a medical term. I think they use it in connection with the heart valve.
- Clarkson: Very common as a medical term. Sometimes it's gotten called a little harsher medical term than that, as an anus valve [chuckles].
- Swent: Oh, really? I didn't realize that. I was thinking it was with the heart.

Clarkson: That's where the peristaltic part comes in, in connection with a human anus. That is a joking term [chuckles], not a dignified term.

Swent: No. Was there ever an A-valve or a B-valve?

Clarkson: Yes, there was a B-valve. Well, the B-valve was actually the "screwball" valve.

Swent: But that was your second.

Clarkson: Yes. It was second. But we called it a B-valve for the literature.

Swent: Was there an A-valve?

Clarkson: No. What might have been the A-valve we designated it the K-valve, the Krebs valve, because I declined to have my name attached, even though it was an improvement on the so-called Sala valve, the Swedish valve, which originated with the Boliden Company. That was the first valve patented in this country. It was really mostly a copy of the Sala valve. That involvement was with Edvin Johanson. Because of that, I declined to have my name on it because Ed Johanson--Ed came up later. He was pretty upset by the way Krebs had handled the deal. It was a personal deal, a handshake deal, that had been made between Kellogg Krebs and Edvin Johanson during the production work, and Kellogg proceeded with a patent. He was going to use my name, so it was patented in his name rather than my name--it was his deal.

Well, the C-valve was a definite improvement in the features because then I designed it with a replaceable sleeve and a so-called muscle, a peristaltic muscle, that actuated the sleeve. And then that patent was in my name but I also shared it with Sala, with Sala having all of the manufacturing rights and sale in Scandinavia for it, with no royalty payments to us on the valve. So then, as mentioned, the C-valve was the first one patented under my name.

Swent: That was in 1963.

Clarkson: Yes, the patent was issued in 1963--(after we split).

Swent: Did it take a long time to get it?

Clarkson: Yes. It was initiated when we were still Equipment Engineers. The patent pending went on for the full length of time for a patent pending. That's a bit of that story.

Swent: Now there's a plaque--you have a wall down here in your schoolroom, a whole wall filled with plaques of patent's. Does U.S. Patent Office send such a plaque, or do you have that made? {Curt had them made by a firm that does that sort of art work.}

Clarkson: Well, to begin with, the corporate attorney firm in San Francisco that we had--Athern, Chandler & Hoffman, I guess it was--as I remember, Hoffman was a patent attorney, and then they had a correspondent patent attorney firm in Washington, D.C., do the work. Well, in the course of all of this--this was after we separated--I made a trip back to Washington. In the course of which, I got acquainted with the firm in Washington.

Swent: What was their name?

Clarkson: It was Strauch, Nolan & Neale. Anyway, I dropped the intermediate attorney in San Francisco and started doing all my patent work direct with the D.C. firm. Nolan was the one I established a working relationship with, and that speeded it up a whole lot, and a lot more knowledgeable coverage because then we were getting into the foreign patenting as well as the U.S. patent--Canadian and some European and Australian. And so from then on, we were still doing our patent work with the same firm, but all the principals that I knew then have all passed on. It's the young fellows, like Curt, that--the one that we work with now on our current patents, he makes a trip out here occasionally--usually in the wintertime, with his wife, so he can do a little skiing when he comes, too. {Fred Bergert}

Swent: So the first ones were in your name only.

Clarkson: Yes.

Swent: The first one was the C-valve. And the second one was the--

Clarkson: The B-valve.

Swent: What you called the "screwball," screw-activated. But there was another one in between that.

Clarkson: There's an H-valve, which was a pneumatic pinch-type valve.

Swent: No, there was--the second patent on your wall, though, was for a--it wasn't for a valve; it was for something else, wasn't it? Was it for the sleeve?

Designing the Clarkson Company Logo

Clarkson: We also had the Clarkson trademark registered, and that was registered in foreign countries, too.

Swent: That's your globe motif. {logo}

Clarkson: Yes. That was a part of the patent work, too.

Swent: How did you decide on that?

Clarkson: Well, Curt, while he was in the army, when he was at Fort Stewart, to pass some of his time away he worked in a hobby shop, and he made a logo with a big C and so forth, which we used a little, and then we decided that we needed something that represented our foreign activity better, so we didn't use that but a short time, I think, when we had to change, after he was out of the service.

And then our sales manager felt we should have some experts in Palo Alto that designed logos for the computer industry, so we spent, as I remember, pretty close to a thousand dollars to have a logo designed. I went over it with them and so forth, and when they came in with their final design, I didn't like it at all. So we paid them off and [chuckles] I told them we were not high-tech. They supposedly put in quite a bit of time.

So then I designed it myself [chuckles]. I was not unskilled in that because I designed the Bradley Mining Company logo for the Yellow Pine Mine that the company used for the rest of the years there. It was a BMCo--I probably have a copy of it somewhere around. It was used. Had it on the doors of the trucks and other things like that for a number of years. On that I worked with Jack Bradley's brother, Worthen. He was artistically pretty talented. He made one for some of their literature showing--it was used on one of the company manuals, showing an airplane and so forth. When I tried some different arrangements, he liked the BMCo logo, and that was the one that was used.

Swent: That's very interesting. Your photography and your mechanical skills and your artistry all come into play.

Clarkson: Useful hobbies. {Sketching out projects too.}

Swent: Very. I'll mention that we were just looking at the pictures that you took at the mining meeting in Orlando. You took some beautiful photographs with your thirty-year-old Zeiss camera.

Clarkson: These photographs were--

Swent: You took those as well? This is a brochure about Stibnite and the school. And you took those pictures also?

Clarkson: Some of the them I took, yes. Worthen designed this.

Swent: The employees' manual. Bradley Mining Company, with an airplane and a cabin and trees. Very nice. If you were doing it today, you would not show those tree stumps, I'm sure.

Clarkson: [chuckles] No. When they were clearing out the airport, had pictures of a lot of stumps.

Swent: This shows pictures of machinery cutting trees. But that would be a no-no today.

Clarkson: This is one of the staff group at the mine. I'm down here.

Swent: There you are, the Bradley Mining Company staff. This is at the end of 1943.

Clarkson: Some of the recreation.

Swent: Pictures of your baseball teams and your skiing and your nurses. Lots of good skiers. Bowling alley, orchestra.

A Rope Tow for the Skiers, Built with Surplus Mill Equipment

Clarkson: It was some of my crew that built a ski tow, a rope tow.

Swent: Did you? In the forties? That was an early ski tow, wasn't it?

Clarkson: I gathered up things from the mill, the drive and all of that, that were surplus in the mill--mill equipment played quite a part in building the ski tow. And the hard part was to get a rope by our purchasing agent. He did a lot of hunting where--you couldn't get manila rope then. It was sisal [pronounced SEE-sal] or sisal [pronounced SIGH-sal]. And he finally found where he could buy sisal. You should know the proper pronunciation. {I think the company's San Francisco purchasing agent, F. A. Hammersmith, had a hand in it too.}

On one trip down to Yucatan Peninsula, Mérida, I went through a sisal rope--twine factory there, because that's where

a lot of it was being grown, in that area. There was a place that had a little railroad where they harvested the sisal {and hauled the fibers to an ancient all flat-belt-driven mill driven by shiny new Caterpillar diesel engine}.

Swent: Henequen, wasn't that the plant they made it from?

Clarkson: Yes, yes, I think--now, what's the proper pronunciation? Is it SEE-sal or SIGH-sal?

Swent: Well, I think they say SIGH-sal in English. It's probably see-SAH in Spanish. Sometimes it's called hemp also.

Clarkson: Yes. Hemp was--{hemp rope & twine--different?} I think that was the more common English name for it. Sisal fibers. But we went to that plant where they were processing the fibers and everything. Also a huge carpet factory in Mérida that we saw. They claimed it was the largest carpet factory on the North American continent.

Swent: When was this trip?

Clarkson: Oh, it was back in the late sixties. {Jan. 1972--my log books are a great source of exact dates!}

Swent: I see. This was after you had your rope tow. It wasn't in connection with it.

Clarkson: This was in Clarkson days, quite a long time after Stibnite.

Swent: I thought perhaps you had made this trip when you were trying to get your rope for the tow.

Clarkson: No, no. {The rope tow time was during the middle forties.}

Swent: You had to have, of course, a continuous rope with no knots in it, didn't you? {Yes, we had some good cable/rope splicers on the mine crew--riggers. Decade of the forties.}

Clarkson: In 1972. {Long after Stibnite--Mexico trip.}

Swent: Oh, that's when you flew your own plane down to--Comanche 8982P--or 2P?

Clarkson: 8982 Papa. That's the phonetic term. {A Piper Comanche NC 8982 P (Papa).}

Swent: I see. And you flew down to Mérida. Oh, there's--

Clarkson: There's {a pilot friend} {Oliver} Sweningsen. We made the trip together. {via Nogales, Torreon & Vera Cruz, Jan. 1972} We sold this plane when we moved over here. That's when I quit piloting. While we're looking at that, this--

Swent: I recognize [Professor] Maurie Fuerstenau there, a good old friend, yes. This is a photograph of you and Professor Maurice Fuerstenau receiving the Distinguished Member Award from the SME in 1982 at the meeting in Honolulu, Hawaii. That's a nice picture. We might use that.

Clarkson: That would be a nice one to use.

Swent: Yes, it would be. While we're talking about logos, you might just tell about the big wooden plaque that's by your door down there. When did you get that made?

Clarkson: Well, just a few years ago.

Swent: Oh, I thought that happened way back.

Clarkson: No, no. Edna and I were on a trip up the Coast. We were going on up to Canada, and we went up the Olympic Peninsula--driving. And in Oregon there was a place that had big chunks of redwood and so forth, and so that was part of our sightseeing. I saw this redwood burl slab, and then my first plan was to use it for a coffee table top. So I bought it and had it shipped to Idaho, to our place up there {Jughandle Mountain}. That's where we were spending quite a bit of time then.

I didn't get anything done on it toward making a coffee table, so I met up with a wood carver near McCall, in New Meadows [Idaho]

So I talked to this wood carver--young fellow. So then I had a new thought--I didn't know when I was going to get at making a coffee table, so I had him carve the Clarkson Company world logo on it. New Meadows, Idaho, where that was done. The way some turn of events happen!

Swent: Well, it's a beautiful thing by your entrance there.

Clarkson: I think it turned out to be a much better use of it than making a coffee table. {Don't you?} There's coffee tables, and then there's coffee tables.

The "Screwball" Valve: Molded and Better for Flow Control

- Swent: That's right. So let's get back to the valves a bit. The second patent that I was trying to recall was for the collapsible tube, but that was actually later in time. The second in time was the screw-activated arcuate pinch valve.
- Clarkson: Yes.
- Swent: Now, what was the special thing about that, that made it different from the first valve?
- Clarkson: It used the same sleeve that the C-valve used. Most pinch-type valves all had fabric in the sleeve, fabric-reinforced. This was designed to use an all-rubber sleeve, without any reinforcing in it, that could be depressed by a ball. Instead of a pinching closure, why, it made like a half-moon-shaped arcuate closure. One of the features of it: a pinch valve, for a high percentage of its closure, just changed shape, but it didn't reduce the size of the opening, until finally it came to the pinching attitude. This valve, by depressing the wall and folding the sleeve in right from the start, it cut down on the area of the opening, which made it more suitable for flow control, something like the C-valve but not as efficient as the C-valve. And it made an interchangeable, replaceable part, and a much lower-cost replaceable part, because all the parts could be molded, rather than fabricated. And it could go to full closure.

A Low-Cost Disposable Pump Adapted for Use at the Standart Mine

- Swent: I'm just recalling reading about a special pump that you designed at the Standart? That also had--
- Clarkson: I really didn't design it. It was application of an already-designed pump that made it quite suitable for handling slurry, rather than just being a water pump.
- Swent: Was that related at all to this? Were there any principles that were similar in this?
- Clarkson: Not really, no.
- Swent: I was thinking because I remember one of the points about that was that it was disposable.

Clarkson: Yes, but the disposable part of it was a low-cost pump in the first place, that was not designed for slurry. But it was found in that case very applicable, and it was such a low-cost pump that, rather than repairing parts on it, you just threw the entire pump away and put in a new pump assembly on the drive base.

Swent: Was this at all similar in this valve?

Clarkson: No. There was no similarities. It was just another innovation that I found to be useful and appropriate. {Nothing to do with valves.}

Swent: This actually changed the shape of the opening, though.

Clarkson: No.

Swent: This constrictor?

Clarkson: No. The pump didn't have anything to do with this.

The B-Valve, a Totally New Approach to Constrictor Valving

Swent: I'm going back now to this constrictor--no, to the "screwball."

Clarkson: Yes.

Swent: Did that change the shape of the opening?

Clarkson: Yes, it did. As compared to a conventional pinch valve, which just squeezed the sleeve like a piece of hose together between parallel bars, and closure didn't take place until the whole sleeve was pinched together, whereas the B-valve--it didn't pinch in the same manner--

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Swent: --the difference, then, with the B-valve.

Clarkson: You're using up tape space, really, with a poor explanation.

Swent: No, no. So your B-valve, then, began closing from the start.

Clarkson: Right from the start. And right from the start, cutting down the area of the valve opening. An arcuate closure.

- Swent: And this was what was patentable.
- Clarkson: Yes. Well, the entire design was patentable. The actuator ball--well, really, that was the feature of it. {Actually a half sphere mounted on an actuator stem.}
- Swent: This was a completely new--
- Clarkson: New approach to valving.
- Swent: How did you get the idea?
- Clarkson: Well, it came partly from the C-valve. Using some of the sleeve parts of the C-valve in a different design body and all of that.
- Swent: How were you doing this kind of innovation? Were you tinkering out in the shop yourself?
- Clarkson: Well, yes. As we had done for the cyclone. Because, actually, my valve work started then--that's how the Krebs deal with Sala came about, looking for an apex valve for the cyclone. Well, that seemed to be a discovery, but the way it was exercised, that was the bad part of it, the actual Sala valve. The early valve design all came from working in control valves for the hydrocyclone apex. That led on to other ideas and applications.
- Swent: Where were you actually doing this? You. Were you sitting at a desk?
- Clarkson: No. Out in the lab, our lab area. As I say, we had lab facilities for cyclone testing with the pump, slurry pump, and sump equipment for the pump. The first testing was to take parts and make some prototype parts, first to see if it worked, if you could do this. Then that was followed by--when there seemed to be something that worked, fit together, why, then some lab tests.
- Swent: What sort of slurry did you use for testing?
- Clarkson: Oh, we had slurry samples for testing in the hydrocyclone from different mining companies, and we had the Utah lab there in the early stages, too. They were always getting mine samples, concentrate, and even drill core for logging. Or just using sand, some beach sand for a make-up slurry.

Tony Mecia Leaves Stibnite to Work for Utah Construction, 1952

Swent: So the connection with Utah. When did that come about, and how?

Clarkson: Well, that was right from the beginning {1952}, when Tony {Joseph Anthony} Mecia came in to head up their mining operations. One of the first things he wanted to do was to set up a lab because one of their early contracts was to upgrade--following the Korean conflict--a little after--this was in the early fifties. They had a contract to improve mining and metallurgical--get the Korean tungsten mines going again. Also, that got into gold. So Utah--Tony put together a crew to go to Korea to make reports and study the situation and upgrade their operation. I'm only citing this history from memory.

Swent: I think that Mecia went to Utah in 1952, didn't he?

Clarkson: Yes. Well, started about the same time that we moved our business from Boise, all of it, to Palo Alto.

Swent: That was in?

Clarkson: September 1952.

Swent: 1952. And Mecia went to work for Utah at about the same time?

Clarkson: Yes. {Moved from Idaho to Los Altos.}

Swent: Was there a connection?

Clarkson: Well, I was the one that steered him to the job. We were both working at Stibnite. Tony was manager of Bradley's Ima Mine. That was a tungsten mine in eastern Idaho. With the trouble with the smelter and so forth, Tony was transferred back to Stibnite to assist with greater problems there--the Ima was running smoothly, continuing under Charlie Hathhorn, mine superintendent, to head up the mining and engineering.

Well, I had made a trip to Salt Lake, and I visited a friend who was director of [the] western division of AIME [American Institute of Mining Engineers]. Roy O'Brian was his name. And in the course of the visit with him, he told me about two jobs that they were looking for a capable, young mining engineer. So when I went back to Stibnite, I passed the word on to Tony about these two companies that were looking for a mining man with good operational experience.

One was Utah Construction, and the other was a Standard Oil operation, American Gilsonite, in Utah. They were mining gilsonite and sending it down to southern Utah or Colorado {Grand Junction} for refining, making gasoline from the gilsonite. And so Tony made a trip to Salt Lake to check on this. He was interviewed and all of that. And he accepted the job with Utah.

Allen Christensen was then president of Utah, with headquarters in San Francisco. And I already had Clarkson Company production going in Boise. In 1952 we decided to move it all to Palo Alto, and Tony reported for his job in San Francisco at the same time. They arrived in Palo Alto just about two weeks after we arrived there, rented a place to live in Los Altos, so we were very close families, with children and--

Swent: Was this a factor in your decision to move to Palo Alto?

Clarkson: No, not really. I could see I was winding up my job with Bradleys, and I could see with Kelly in San Francisco it was just too awkward to be that far apart. That made my decision. That was a happy decision between the two, between the Mecia family and the Clarkson family. We were both going to get down there about the same time. Tony wound up his job in that period with Bradleys. {At that point in time it was quite obvious that Stibnite would shut down.}

So after we got ourselves established, we conferred together a whole lot about the next people to hire for Utah, and he wanted to talk to me about setting up a lab for them, and they established an engineering office in uptown Palo Alto. Also, Tony had a part-time office for himself on El Camino in Palo Alto. So a lot of Utah's mining activities were all set up in Palo Alto, with the main office in San Francisco.

Mecia Hired Other Stibnite Engineers

Clarkson: But also Allen Christensen lived--I think he lived in Atherton, right in that area. And Tony started then hiring other Stibnite engineers, which included Si Do Foo to man the lab, Ed De Moss too--he moved from his job at Henderson, Nevada. He first moved to California and later lived in Menlo Park. He was assigned to Utah's Campbell River job on Vancouver Island, which was an iron mine. That was one of their early mining

operations, and it was losing money. Ed De Moss went to Campbell River for on-the-job-site management there.

And so the Stibnite fellows kept being hired. Two or three of them went to Korea on that assignment, then back again. That was essentially how--the transition from an all-construction company to an international mining company.

Swent: What was the connection, then, between your two companies? Were you doing work for them?

Clarkson: Well, yes, in a way. Where it involved mill and metallurgical work and so forth, even quite a few feeders. When they upgraded the flotation methods in Korea, quite a few feeders went there. But all of this was pretty well underway by the time we got into the hydrocyclone business.

Acquiring the Centriclone which Led to the Hydrocyclone

Clarkson: The start of the hydrocyclone venture was the centriclone, which was patented by a San Francisco mechanical engineer {Norris Goodwin}. We acquired his patent and, in turn, licensed it to Oliver Filters in Oakland for the food and chemical industry.

I thought I reviewed some of this in our earlier--

Swent: Yes.

Clarkson: That's why it would be good if we--so we don't get too repetitious here.

Swent: I hadn't been clear on the connection between your company and Utah, what the relationship was there.

Clarkson: Well, it was a friendship, but another nice thing, Tony got an early stock offer from the company. Then the uranium activity, Shirley Basin, was starting. So in order to take all of the stock that was made available to Tony, he offered half of it to me. So he at that point didn't have quite enough money to take up all the offer, so we shared an early stock issue--{it was really a nice gesture on his part} [chuckles]. And it turned out to be a very, very good investment.

Swent: Yes, indeed.

Clarkson: But even though I didn't take on any contracts. It was just the business action and a friendship deal with Tony and all of these--and that's, of course--when Tony and the other fellow {Homer Mann} was killed, why, that was also--Bud Wilson was one of the Stibnite fellows. Had come in. And he really felt at that point in time, or later, why, he was well enough established and qualified--he was selected to fill in to the void Tony left.

The Tragic Death of Tony Mecia

Swent: That accident must have been a terrible blow for you, too.

Clarkson: It was, because of the closeness of our activities.

Swent: How did you find out about it?

Clarkson: Well, by a telephone call first received in Utah's San Francisco office and relayed by Bud Wilson to Palo Alto, and also heard it on the radio that the Utah plane--I knew--we had talked about some of the business just before he made the trip over there, and he had planned to take the youngest daughter with him on the trip, and then something--

Swent: One of his daughters?

Clarkson: One of his daughters. And something changed that. I don't remember what, but that was fortunate that she wasn't along on the trip, too. Named Tori, short for Victoria.

Swent: So who called you to tell you about it?

Clarkson: I don't remember who it was now, but probably Bud Wilson. An engineering crew and some of the office crew were in Palo Alto. I don't remember now. But the word came almost immediately after the crash. {I think that Ed De Moss who was then in Cedar City called.} And so I was one that had early word of it. But I think, at the same time, Allen Christensen was notified of the accident. The flight, I think, originated over in Oakland. That's where the plane was based, the company plane. {A Lockheed Lear Star}

Tragedy Strikes the Bradley Family Also

Swent: That was a terrible thing.

Clarkson: Yes, it was. But then with the Bradleys, too, all in that same period--Worthen died of a heart attack, and just a few months later Jack and then Tony, so in our little associated group, there was an awful lot of tragedy. Jack Bradley and I were just almost the same age, I think, just a year--he was a year younger than I was. His wife, Jane, was a little older than Jack. My birthday was in January, and her birthday was in February. {Jane's father, Stanley Easton, was also a prominent mining man in Idaho--Bunker Hill & Sullivan.}

Swent: That was an automobile accident, wasn't it?

Clarkson: Yes. Tragic. {Drunken driver--head on.}

[Pause of several moments as Mr. Clarkson goes through papers.]

Swent: You're looking for something there?

Clarkson: Yes. A reminder.

[tape interruption]

Swent: --ask you a little more about the organization of your company. When did you--you had directors, did you, right from the beginning?

Clarkson: No. It was just in December of 1949 we discussed a partnership.

Swent: Yes, well, I'm thinking of when you separated from Krebs and began--was Tony--

Clarkson: January of 1950 when I took the feeder over. That was the entire business. We set it up as a partnership between Kelly and myself. Kelly was marketing manager, and I had all production. Then in 1952 Kelly found this centriclone patent, and I up in the Stibnite machine and welding shop built one of the first prototypes and started testing in the mill there. Kelly made a deal to acquire the patent rights, and you remember that we talked about Ted Edinger.

Swent: We've pretty well covered that, I think.

Clarkson: Got together with Ted to build some of the parts in his shop in Grass Valley. Then Kelly's brother, Dick, to do some of the test work on that. So we acquired this patent on the centriclone, then--this was about two years later--then incorporate--incorporate the Clarkson Company. Dick [Krebs] and Kelly--and I was agreeable to it. Instead of using the overall Clarkson name, we incorporated as Equipment Engineers. That's when Kelly's brother came into it as one of three of the corporation, and Clarkson Company became a division of Equipment Engineers. But it was decided best to incorporate to continue--because all of our literature and everything was Clarkson Company literature. The sales books and all of that. {Kelly always referred to the importance of becoming a three-legged stool--Dick's entry into the firm!>}

And then in order to please Dick, his brother, he thought that it was a little too much for it to be all Clarkson Company, so then we went on from there with the cyclone development. I think we talked about that.

Swent: Yes, we have.

Clarkson: With Oliver Filters and the Dorr Company and so forth.

Incorporating the Clarkson Company

Swent: But after you separated the companies, when Clarkson--when you separated from Krebs and you had your own company--

Clarkson: Then we incorporated the Clarkson Company. Then, after incorporation, I had a board of directors with some outside directors.

Swent: And who were they?

Clarkson: Edna's brother, Edward Evans. And Art Norman. Art, however, he actually went with Krebs. He became president of Krebs after Kelly's death. {Dick didn't want that responsibility. Wanted to spend more time on his sailboat.}

Swent: But he was also a director of your company?

Clarkson: Clarkson Company.

Swent: How did you select these people?

Clarkson: Well, by their experience, because Norman worked for the Clarkson Company for which he was hired. He handled the marketing of Clarkson feeders and the products we had. He knew the company. I selected him because if anything happened to me, he was the one person who--Curt was still in school, and Edna's brother was in the army. He was an army career man. So there was no one if there was any accident. I flew a lot in connection with the business and so forth. Art was willing. He knew the company business and everything, so that was my reasons, and in the stock division from E.E. Inc., a few shares of C. Co. was retained by him.

The other outside board member was Bill Holz, the rubber man. Holz Rubber Company in Lodi. I worked with him right from the beginning on all of the rubber work, so he knew our rubber business--cyclone and valves.

Swent: How had you met him first?

Clarkson: Through Dick Bonebrake. Dick was a mining, metallurgical engineer. He was a fellow that I met back up in the Jim Curry days in Grass Valley, in the late thirties, because he was Ted Edinger's brother-in-law. Those were all of common interest. He was Bill Holz's engineer in rubber applications for the mining industry and so forth. And Bill Holz's industrial rubber molding was just a fledgling company then, too. Half a dozen people, including Dick Bonebrake. He was the engineer for Holz.

Swent: So he was manufacturing your rubber components.

Clarkson: First for the centriclone and cyclone and then eventually our valves.

Swent: So he was one of your directors, was he?

Clarkson: Yes, Bill was an outside director. And Miss Brown, Grace Brown.¹ She started with our company right from the beginning in 1950. She was the secretary and bookkeeper and she had several different hats to wear; formerly with the consulting firm, Hamilton, Beauchamp, & Woodworth. (H., B. & W. also had another office lady.) So she worked--because we had an office with the consulting firm. That's where Kelly had his office.

¹Grace Brown's brother, Bert Brown, for many years was mill superintendent at the San Luis Mine, Tayoltita, Durango, Mexico. For more information see Langan Swent, Working for Safety and Health in Underground Mines: San Luis and Homestake Mining Companies, 1946-1988, Regional Oral History Office, The Bancroft Library, UC Berkeley, 1992.

She did, among other things, purchasing work for us, and she had a lot of mine background experience with H., B. & W.

Swent: So she also became one of your officers?

Clarkson: She became secretary. She was secretary of Clarkson Company. But her full-time job continued with Equipment Engineers. She was a very loyal--even though all of her last working years was with Equipment Engineers, the Clarkson Company was [chuckles] her baby. That's the way she used to put it and I gifted her some of the Clarkson Company stock.

Swent: Did you ever consider having Edna one of your board members?

Clarkson: No. She was really--Edna was--her role was always homemaker and the children. She was interested, but didn't feel that she could contribute to anything as a board member. She really wasn't business minded, but very watchful. She had her opinions {and they were usually good ones!}. When we had pretty serious decisions to make, why, she gave good counsel. {She had many longtime homemaker friends among mining couples.}

Swent: What were some of those serious decisions?

Clarkson: Well, in our dealing, when we were taking on development of new products, or working to increase sales through our industry acquaintances, that kind of people--she was a good judge--I always thought, and she worked her side of it like hosting a dinner or cocktails at home or eating out at a popular place.

Swent: Be more specific, please.

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Clarkson: People that she had met or known over the years, like on-the-job mining people and consultants connected with equipment firms like Galigher, EIMCO, Cyanamid, WEMCO, MASCO, and DECO. Some had wives that she knew. Not the least were Stibnite couples that went on to jobs with other mining or equipment firms such as Si Do Foo to the Dorr Company, Frank McKinley to Humphreys Engineering, Jim Lange with Galigher, and a lot of others.

Swent: You said that she had some input on serious decisions. What were some of the serious decisions that you made?

Clarkson: Our split-off from Equipment Engineers (Krebs) was probably the most difficult one--emotionally.

Swent: You discussed that with her?

Clarkson: Very much so. Always. Well, as I say, her part was the comments that she picked up from some of the wives, the corporate wives and others. Even today a very close-knit friendship has continued with some. Of course, Betty Mecia raised her family in the Palo Alto area. Our children were all friends; the Wilsons, De Mosses, Do Foos, Keith Wallaces' and the John Andersons, too, all former Stibniters now working for Utah. {Mecias, De Mosses, and Wilsons later lived in Los Altos Hills.} As well as some other couples whose husbands continued with Krebs.

Swent: Before you hired somebody, did you ever have Edna meet them and help in hiring decisions?

Clarkson: Yes, sometimes--she usually knew something about background along business or mining-related activity. {Note--Edna says she hired Hank (Hank Frohlich) when he came to our house for an interview after we moved the company to Sparks, Nevada.}

The Sulphur Bank Mine, California

Swent: Did you ever go to the Sulphur Bank Mine?

Clarkson: Oh, yes, several trips. Because sometimes we would make a trip to look at equipment that we could use somewhere else or make some improvements in existing setup and things like--like some winding down--we went down to look at some of the pit equipment, the mining equipment, that could be used at Stibnite. Dumpster trucks used for short haul stripping work.

Swent: Dumpster?

Clarkson: Koering Dumpsters. They were a popular type of pit equipment, especially used for stripping operations, because they dump automatically. You loaded them, and drive them forward or backward, both at the same speed, but when we got to the edge of the dump with them, put on the brakes, made a quick stop backing up. That tipped the bed over, and it automatically dumped. They were a shuttle-type of truck. {Koering dumpsters. Koering, I think, was originally a Swedish company.}

Al Wolbert was the superintendent of the mine. He was quite a character, too. Of the old school. There was a lot of interesting things about the pit there. There was a lot of--

every once in a while there'd be a lot of steam, the geotherm action in the pit. They used churn drills for the bench ore blasts. Every once in a while, they would drill into a geotherm seam and it was known to blow the drill string right back out of the drill hole.

And then there was one that I happened to see that they had drilled there, and the drill rig was moved away. But they called it Old Faithful because about every forty-five minutes or so, there would be a spout come out of the drill hole. The gases--because of the geoseismic activity in the pit as they opened up ground, why, every once in a while there'd be, I guess, a crevice or something that would emit a lot of underground gas. They actually had to use big fans to blow the air out of the pit to get rid of some of the bad air there for workers.

But that was Bradley's major cinnabar operation during World War II. And they had two other mines, two other mercury mines in the area. The Reed Mine, which is in the same area as Homestake's McLaughlin Mine,¹ and the Great Western, which is also right in the Clear Lake area.

Swent: Were they all operating then?

Clarkson: The Great Western. It didn't produce much ore. It was more a development. But the other one in California, then, was the Mt. Diablo Mine.

The Mt. Diablo Mine

Swent: That was Bradley also, wasn't it?

Clarkson: That was Bradley also.

Swent: And did you visit all those?

Clarkson: Yes. I helped to design a new screening plant for the Mt. Diablo because they developed a new market there, selling the rock that had been through the retorting system, through the cinnabar mill. It was a nice red rock. They sold it for landscaping in the area there, Walnut Creek and so forth. So

¹For more on the Reed Mine, see the Knoxville District/McLaughlin Gold Mine, Northern California, 1978-1999, oral histories in process, 1999.

we redesigned the crushing and screening plant to actually crush and screen some that was too low-grade for just mercury production, but it made a nice landscaping rock.

Swent: Were they processing for mercury at all? Did they have a mercury--

Clarkson: Yes, they had a kiln and condensers there, for retorting.

Swent: Did you have anything to do with that?

Clarkson: No, not really. Sometimes I would call down to see whether improvements could be made in the setup. One of the last trips that I made to the Diablo, I came to San Francisco and Worthen drove me out to the mine from San Francisco. After that, we went to a football game [chuckles]. {The San Francisco Seals, I think.}

Swent: So you came down from Stibnite then.

Clarkson: Yes. The main job, of course, was with the Idaho operations. The two mines in that part of Idaho--the Ima Mine and the Stibnite Mine. But also considerable back-and-forth activity with Bunker Hill at Kellogg, Idaho. Because of having the company plane and so forth, we made all those trips pretty fast. If we had been doing it by road all the time, why, we would have been spending more time on the road than on the job.

Swent: Did you ever pilot the company plane on these trips?

Clarkson: Oh, yes. I was a company pilot, too.

Swent: You were that, too.

Clarkson: Yes. They had the Bradley Field in Boise, and they had pilots there that acted as company pilots, as well as all the fixed base operations: student instruction, airplane sales and all of that. That was one of Jack's pride and joys was the building of the Bradley airport in Boise. That was tragedy, too, because of Jack's death and the shutdown of the two mines there. That all contributed to the demise of the Bradley Field. Jack Bradley was also an accomplished and a very skilled pilot. We had common interests, too, because I enjoyed my role as being a company pilot. I had a company car first and a company airplane [chuckles]. {A Navion} That was pretty nice.

Swent: Did they have a landing strip up at Clear Lake also? Did you fly up there?

Clarkson: The field was out of Clear Lake a ways. It was a little resort there, too. Let's see if I can say the name of it. {Hoberg's} We flew over there every once in a while. I didn't ever fly right into San Francisco then. {Couldn't fly a private plane into California during the war.} I would fly down as far as here, and use the Sparks [Nevada] Field, and then usually drove from here over. But a lot of our trips then were auto trips, and then sometimes commercial airline, too.

Swent: Let's get back on track a bit here. I had asked you about Edna's role, and you were just saying that she helped you a lot. And I think I had asked you about whether she had any input on hiring people, and you said Yes, that she did understand the background of people. Did you hire any new people that you hadn't known for a long time? After you formed your company, your independent company.

Clarkson: As the crew increased, why, just for shop jobs and things like that.

Hiring Moonlighters from Hewlett-Packard

Swent: But your executive positions were mainly drawn from people you already knew?

Clarkson: Like in Palo Alto, we didn't even have a parking area for the first plant in Palo Alto, and on Loma Verde Avenue we didn't need it because all the employees lived right in the area, and that's the way some coming in the door did look for a job--but one source of good help in Palo Alto was Hewlett-Packard because some Hewlett-Packard employees lived right around the Loma Verde area, and they--like a machinist, a couple of machinists, and a draftsman that I hired. They were good moonlighters. Because they lived right there. They would work two or three or four hours after their workday at Hewlett-Packard. And there was quite a period there that I had Hewlett-Packard employees work like that for me. In a couple of instances, they became full-time employees. It offered a little closer job to where they lived, and Hewlett-Packard then, in our beginning {1950s}, they were in their one building on Park Street, just across the railroad tracks, on the west side of the tracks. That was a good source of some good help.

But as we grew in later years, the late sixties and the seventies, why, then we had to start hiring people that lived across the Bay, and in the San Jose area. We couldn't keep

them all in Palo Alto. The cost of living there started going up. Changes like that. And when we moved, why, then the employees--

The High Cost of Housing in the Bay Area a Problem for Employees

Swent: When you moved--

Clarkson: From there to here. Why, then the employee problem got to be one of our reasons for wanting to move.

Swent: What do you mean by that?

Clarkson: Well, new employees and some of the workforce in Palo Alto, in order to have an affordable home, lived clear down in the San Jose area or in the East Bay area, like Fremont. Our accountant, Norma Pedrick, did live in Mountain View, but she rented a house, and then she was able to buy a real nice new house over in Fremont, then a pattern of commuting from around or across the Bay to Palo Alto. That got to be more so all the time, people that we hired lived quite a ways from the job. So that became one of the reasons for thinking about moving away from the area. {Long-distance commuting was expensive too--in more ways than one.}

Lockheed Competes for Employees

Clarkson: The big change that we saw was when Lockheed came to the Moffett Field area, they accounted for about 20,000 people. That was when we really felt that impact on employment. We saw a pretty substantial change in the availability of good people. I even had people quit, got a better job with more pay and so forth, for Lockheed. And then south of us, like in Sunnyvale and Mountain View and all around, residential places all became more expensive.

Swent: When was it that Lockheed came in?

Clarkson: It was about--the middle or late sixties, I think, that Lockheed came in with their big move into the Moffett Field area.

Swent: How many employees did you have in 1959? When you became an independent, separate company. How many employees did you retain?

Clarkson: Oh. Probably seven.

Swent: And what were they? What kind of jobs?

Clarkson: Well, draftsmen, accountant, secretary/bookkeeper, and then the shop crew, the production crew. Mostly machine work, assembly work, and shipping.

Swent: Were you actually building your machines there?

Clarkson: Yes. Well, the feeder and Krebs cyclone--some parts.

Swent: But you split off then from--

Clarkson: Yes, but Clarkson continued to machine cyclone parts for them. When we split off, all of the shop equipment, the job facility, and the main building all came to me. {At that point in time earnings from the cyclone was substantially greater than for the feeder. A valve market had really not been developed yet.}

Krebs built a new building right next door to us, but they didn't have any shop equipment to start with and they didn't have a crew for production. There was a machine shop, a job machine shop, just a couple of blocks from us. He {Nick Martinsen} had a crew, and he did, in his shop, a lot of the heavy parts work for the cyclones, heavier machining than the reagent feeders and valves and so forth. He was retiring and selling off his shop equipment soon after, so Krebs acquired that shop equipment and moved it into their new building, and until they got that segment of their business established, why, Clarkson continued all of that work.

Swent: Were you personally doing the hiring of people?

Clarkson: Oh, yes, yes. Well, the shop foreman, he would find a person that he thought was suitable to work for us and recommend him, but everything was pretty close then, with the entire crew. I didn't dominate everything, you know. We did make decisions as a group when it came to hiring someone. To establish the need and all of that, and finding out what their background was, whether they were qualified sometimes. But I--

Hiring a Sales Manager, Leland Aplin

Swent: You were still running the show.

Clarkson: Yes. We didn't have a marketing person--we didn't have any reps. All the marketing was direct to mining companies, and the engineering companies that were doing a contract job. I went out and made job calls occasionally. That was mainly Dick Krebs' job. He was supposed to be field engineer and salesman. But after we split off, I hired a sales manager, Lee Aplin. I already knew him pretty well and knew his background. He was an instrument man. He had been quite a few years with Minneapolis Honeywell. He was a Palo Alto resident, and so I had a chance to know him quite well before I hired him. He was interested, and he set up our first rep organization. Did a good job of it.

Then we were getting activity, especially with the C-valves, that required considerable instrumentation, he was well qualified for that role, too, as well as he was a sales person with Minneapolis Honeywell, he was a sales and service man on Honeywell instrumentation, so he came with Clarkson as sales manager almost up until the time we moved over here to Sparks.

Palo Alto Zoning Forces a Move

Swent: You moved once in Palo Alto. Didn't you move your plant in Palo Alto once?

Clarkson: We were zoned out of our original site.

Swent: How did that come about?

Clarkson: Because we were zoned out.

Swent: What does that mean?

Clarkson: Well, our first facility on Middlefield Road and Loma Verde in south Palo Alto, that was established as a light industrial area, ideal for us. {Had been primarily a farming area. A dairy farm was nearby!} Well, then, politics and growth in the seventies, why, the city council set out to rezone those areas to residential.

Sharen: {at the door} It's raining, and your car window is down about this far. Do you want us to put it up? {Note--Sharen, executive assistant--we've since lost her--moved to Denver. Now it's Valerie.}

Clarkson: Yes, please. It's a power window.

Sharen: That's what we figured, so I'd better get your key.

Clarkson: Thank you.

Swent: That's nice.

##

Swent: So this was--I guess this was after Curt had joined you, then.

Clarkson: Yes.

Swent: The zoning regulations changed.

Clarkson: It was changed. We had a very controversial city council, they were anti-industrial in a lot of areas. They wanted to put everything in the Stanford Industrial Park. South Palo Alto then was quite an industrial area. It had been--there was a lot of farming. Still there. A dairy farm right near where we were. They were pushing to get rid of all that. City council got recalled, and at the time I served a couple of terms on the chamber, the Palo Alto Chamber of Commerce. There was a lot of friction with the city council because up until that time, the Chamber of Commerce got financing from the city. So the chamber renounced city funding because the chamber, which represented mostly business interests, they didn't agree with the city council, so the Palo Alto Chamber of Commerce became an independent organization, without any city money being taken for expenses. We had one council member that was a mining engineer and a friend.

Swent: Who was that?

Clarkson: Bert Woodward. He really went to bat for us. Even with the recalled council, why, we were losing, so fortunately I was able to buy a nice piece of property on West Bay Shore, and we built a new building there. We needed new and larger facilities anyway. But there was a time that our Loma Verde property--the land--the price hadn't started escalating. If we had hung onto it a few more years, why, we would have probably tripled what we sold it for. But still, I needed the money to help build the new building because we didn't lease. We leased

when we started out, and then we bought the property on Loma Verde. But still, by selling the old place and so forth, we were able to upgrade our new facilities a whole lot.

Swent: Did you consider moving into the Stanford Industrial Park?

Clarkson: At one time, early. But we were not really up to that class. In our first years there, Stanford--the old mining college--was still pretty active as a mining school. Then we had a few good contacts there, good relationship. But then I think it was late in the fifties, why, they changed all of that at Stanford. It became mostly the petroleum industry, that type of earth resources, and metal mining engineering and all of that was phased out at Stanford. That kind of ended our relationship, with any possibility of being in the Stanford Industrial Park. Then it became too sophisticated for us. We were not up to that level {high tech}. Even though we had a pretty good relationship there, we were still pretty small shakes in the whole scheme of things.

Swent: Did you ever get acquainted with any of the people in the electronics business? Did you know Hewlett or Packard?

Clarkson: Well, of course, Hewlett-Packard was still in its early years.

Swent: Did you know those people?

Clarkson: Yes. I never--I met both the principals, but mostly lower-level people--because we got help from fellows that worked for Hewlett-Packard. One of their policies that really had been my style with the Bradleys was the way we handled employees. We early on set up a profit-sharing trust fund for our employees, and influenced quite a lot like the early Hewlett-Packard relationship and treatment of their employees. So I like to say that even the way we operate today, non-union and so forth, was kind of in the philosophy of Hewlett-Packard in their early days of the company.

Socializing in Palo Alto

Swent: How were you aware of how they ran their company?

Clarkson: From those that I knew.

Swent: Who were they?

Clarkson: Like in the Lions Club. Or in the Chamber of Commerce there was a Hewlett-Packard board member in the Palo Alto Chamber of Commerce.

Swent: You were on the board.

Clarkson: For two terms in that period. And other activities that we participated in.

Swent: What were some of them?

Clarkson: Well, even--I dimitted to the Palo Alto, to the Palo Alto Masonic Lodge. A number of the Masons in the Palo Alto lodge and later, there were two lodges, the Palo Alto Roller Lodge. Some of the old-timers there, they were all business people in Palo Alto--had--it was a lot more of a community in those days, the people that I knew and socialized with in that period.

Swent: Did you ever join a country club; were you a golfer?

Clarkson: In late years, the Palo Alto country club was new, in the Palo Alto Hills. I joined just the lunch club, and sometimes we would have company dinners there, like that. But it was too far away and really took too much time to take guests up there. I had a better system going because we were only just a few minutes from the Palo Alto airport, and I had an airplane there. Sometimes our visiting guests, I would take them up to the Nut Tree for lunch. Didn't take much more time to fly to the Nut Tree and do that than to drive up to the Palo Alto Hills Country Club.

Swent: It was a lot more glamorous.

Clarkson: But others, like the fellow {Nick Martinsen} that had the machine shop close to us on Loma Verde, he was a charter member of the Los Altos Country Club, and he was an avid golfer. I would go out with him, play golf in Los Altos and others around, like the one up in Palo Alto, like--I can't say the name now, but the one up by Portola Valley {Sharren Heights}. And sometimes we'd go up to Crystal Springs and play there. I used to play quite a lot, but with Palo Alto friends.

A very active group in Palo Alto was the Palo Alto Shrine Club, too. It finally disbanded about the time that we moved over here. All of those--like the Palo Alto Host Lions Club, when I joined had over a hundred members, and the last I had a count of them, down to about sixty members. And all of those service organizations--the only one I knew of that continued to grow was the Elks Club. I had invitations to join the Elks

Club in Palo Alto, but that was too much. I couldn't keep up with--I thought one at a time was about all I could handle.

Swent: Did Edna participate in any of these things with you?

Clarkson: She didn't play golf, but--

Swent: --Eastern Star or--

Clarkson: While we were there, Edna joined the P.E.O. She was real active in the First Methodist Church activities because we had the kids, Claudia and Curt and so forth. She had all that she wanted to keep up with.

Swent: Have your children--has Curt, for instance, joined the Masons or the Lions or any of those things?

Clarkson: No, he hasn't because he has so many other activities. In Palo Alto, he was involved in Jaycees and church activities.

Swent: DeMolay?

Clarkson: No. Curt was always in church activity. Curt made two summer trips with youth groups, Young Life, they called it. He made a summer trip to Canada as a delegate and another one, another summer, to camp in the Sierras. Then he started the mine work at the end of high school. One summer job in Wyoming on one of Utah's jobs {Lucky Mc} and all of that.

Here, there is just simply no time for service club work. He's probably told you he's currently chairman of the St. Mary's Hospital Foundation and helped to establish a new Presbyterian church on the north side, and he's very active in that. But it's just like the other young people. There's so much that they don't have time for service clubs.

Swent: They do different things. Did you do any church work in Palo Alto?

Clarkson: Yes. First United Methodist Church. For years I was on a maintenance committee to make improvements and maintenance of the facilities. In that period, the big new sanctuary was built, so I had quite an active part in all of that, as well as men's activities. Then the so-called Fireside Group, senior group. Edna and I were one of the youngest couples in the senior group. {Made the lettering forms for the concrete sign there.}

The minister, the senior minister, when he retired he became a bishop and he was transferred to Denver, bishop of the entire western--Marvin Stuart. He lived on Hamilton Avenue. He lived just across the street from us.

Swent: You were neighbors.

Clarkson: Yes. The Stuarts {Marvin and Mary Ella} are living in a retirement place there, a big one. Can't say the name of it.

Swent: Near Palo Alto?

Clarkson: In Palo Alto.

Swent: Channing?

Clarkson: Channing House, yes. I should have thought of Channing Street first.

Swent: That is such a wonderful place, yes.

Clarkson: We've known quite a few that retired there. That--for Channing House they had to buy their place, and then they had income, too, I guess. But at their demise it would revert back to Channing House. It was like a trust they set up.

Swent: It's a lovely place.

Clarkson: Yes. It was one of the first of that type to be built in Palo Alto.

Swent: So you built your building then on West Bay Shore. How many employees did you have at that time?

Clarkson: When we moved from Loma Verde, I think we had thirty-some.

Swent: So you more than doubled your employees.

Clarkson: Yes. [When] we moved here, we had about sixty employees, when we moved. {Not all were brought along though.}

Swent: Growing exponentially.

Clarkson: [chuckles] Yes.

Some Changes in Fabrication of the Reagent Feeder

Swent: Well, we'll get to that in a bit. But now, your next--you said at one point that your "C" valve had stayed virtually the same from the beginning to today, that there had not been--no, your reagent feeders stayed virtually the same also.

Clarkson: Yes.

Swent: And you were continuing to produce these, of course.

Clarkson: Even now. They stayed virtually the same from 1936 to the present.

Swent: And made of the same materials.

Clarkson: Stainless steel {was the basic material over all those years}.

Swent: Once that change came in--

Clarkson: The method of building the parts changed, but basically it's still just the same.

Swent: How did the method of building change?

Clarkson: Well, a few years ago, a half dozen years ago, the company that made the stainless steel parts, they outgrew our production requirements. They were demanding much greater quantity to be able to set the tooling up and so forth. The process was called deep drawing. That was a press operation that pressed the sheet stainless steel into the shape of the part. It stretched, like making a pot or a bucket or anything like that out of stainless steel. When it was a privately-owned company back, oh, maybe twenty--I'm just guessing--twenty years ago--they sold out to a Japanese company--

Swent: And where were these made?

Clarkson: In southern California, in Glendale. They wanted us to give them orders for a large quantity. The quantity they wanted would be maybe two years' production for us. So we found a company here that made kitchen vessels and parts out of stainless steel, but it was a fabrication process rather than a deep drawing process. They looked over the parts. They were glad to have it because more custom-like work, and they could do it at prices that the market for the feeder would justify, and so now these parts that were formerly deep drawn are fabricated, and that actually turned out to be an improvement

because we eliminated some aluminum parts that went along with that. Now it's all stainless steel, rather than being just the exposed parts of stainless steel, so it makes a better unit out of it and still just as effective, and at a cost for the parts that still holds our market, rather than pricing us out of the market.

The Forty-Dollar Item Now Costs \$900

Swent: The original ones you were charging \$35 or \$40 for, as I remember. How much are they today?

Clarkson: {Those were belt-driven models with a takeoff from some other drive like the Skimmer Shaft on the flotation machine.} Well, it gets up into the thousands now. It's like everything else. The difference in a two-cents postage stamp and a 32-cent postage stamp. {Little gear motors were found to adapt to the S.S. model.}

Swent: That's right.

Clarkson: And about that period of years, from 1936 to 1998.

Swent: About how much does one cost today? Would you ever sell just one?

Clarkson: Yes, there's quite often just a single unit. But then there's duplexes and triplexes and quadriplexes. But a single unit--I haven't looked at the prices lately--is about \$900. I think they're still under a thousand, for a single, just a standard unit--I think is still under \$1,000.

Swent: And you're selling them, still, all over the world.

Clarkson: Yes, yes. The flotation process is still one of the--I think it's coming back some because the deeper mining--they're going back to underground mining, which--the deep ores, the sulfide ores, require flotation.

Swent: Do you still have sort of a tie-in with American Cyanamid?

Clarkson: No. American Cyanamid is pretty much nonexistent in mining chemicals any more. They sold the divisions and so forth. One of their offshoots sells--they have cyanide plants around the country, but it's not the same kind of company. It has been merged, so I know very little about it now, in its present-day form.

- Swent: Your reagent feeders are--as I understood, originally they kind of went along with the Fagergren cells. Is there still that companionship--
- Clarkson: No. Flotation machines have changed tremendously, just in recent years. The Fagergren cells--I don't think the name is even used any more. They have the so-called deep cells, and all the old names have disappeared. {Faded out!}
- Swent: But the new equipment still can use your reagent feeders.
- Clarkson: They put chemicals in the process and also in paper manufacture. They're still used for feeding dyes--
- Swent: That was my next question, whether it was used for any application other than mining.
- Clarkson: And some in food, too, feeding additives in the making of the cereals. I don't know--I think the food is a pretty low percentage, but there's a few that still find applications in that area.
- Swent: How much of your business now is in the reagent feeders?
- Clarkson: Well, it's a tradition, but probably only about 2 percent.

The Reagent Distributor Still Has a Market

- Swent: I see, a very small amount. It's mostly the valves now.
- Clarkson: Yes. But there's another product that goes along with the feeder that we get quite a few orders for. It's a reagent distributor. It takes the flow from the feeder, and it can be split several different ways, accurately, so that one feed comes out of a feeder, one stream, and that one stream can maybe be split half a dozen different directions in different percentages to go off to various points of addition into the process flow.
- Swent: I think you had talked a little bit about that. So it's the valves and accessories now that are the big thing, and there have been a lot of improvements in the valves.
- Clarkson: Yes. {To keep us in the forefront.}

The H-Valve, a Valve in a Housing

Swent: Your pinch valve was patented--what you call the "screwball" valve--was patented in '66, and the next plaque that you have on your wall was for the collapsible tube.

Clarkson: H-valve.

Swent: That was a valve also?

Clarkson: Yes.

Swent: It was just called a tube.

Clarkson: It's in a tube housing. It's used a lot in the feeding of lime into process its so-called modulated instrument control, so it modulates the flow going into the process, for pH control. They feed controlled amounts of lime into the process, but it's all instrument-controlled, and the instrumentation controls the valves. It proportions the amount going into the system. There can be a whole series of these valves, strung out along the process. {pH control}

Swent: This is still a slurry.

Clarkson: Yes. It's a lime slurry.

Swent: And that was just not too long after Curt had come aboard.

Clarkson: Yes.

Swent: But the name on the patent is still yours. I presume you started the application before he joined the company.

Clarkson: Yes, I think so.

Swent: You got it in 1970, so you must have applied a number of years before that.

Clarkson: Sometimes they went on as many as four years. But that period extended the life of the patent because you were protected from the time the application was made. Then the actual issuance of patent, then it is good for seventeen years before it becomes public property.

##

Swent: Within the next--you jump into what sounds like quite a different kind of valve here, a gate valve. Is that a different--

Clarkson: It's called a knife-gate.

Swent: In the patent it's just called a gate. And then a lined valve comes in much later. But let's talk--the first patent for the gate valve was in '81. You call it the knife-gate. Is this a different principle valve, quite different?

Clarkson: The principle is pretty much all the same, but different design features, including the design of the elastomer wear parts and the body to suit certain requirements.

The Use of Elastomers in Valves

Swent: Elastomer is a new word. We haven't had that before.

Clarkson: Well, the heart of all the valves is the elastomer.

Swent: But it has been rubber up till now.

Clarkson: See, elastomer covers the whole spectrum of rubber-like materials, like there's natural gum rubber and then there's the synthetics that are elastomers. There is a difference there from elastomers from plastics because the plastics are rigid, where[as] the elastomers have rubber-like physical properties, but it's not rubber [chuckles]. It's neoprene and the various "prenes" that are used today for food, gloves, you name it. They have to be stretching or have--another term with rubber is its memory because rubber has good memory. You stretch a rubber band way out and then you release it, it goes back to its fixed size. So that's memory. All these terms are used when you set up the requirements for a certain function with elastomeric properties.

Swent: Up until now you've been using rubber, had you not?

Clarkson: No, we've always had to work with synthetics. Some jobs, like a pulp that had hydrocarbons in it, rubber is not good because the hydrocarbons, the oil, softens the rubber and then it loses its wear surface qualities. Like neoprene will stand up under hydrocarbons much better. And coal handling and things like that.

Swent: Did Holz deal with synthetic rubber?

Clarkson: Yes, some. See, there had to be pioneering in that area because during World War II the synthetics started, but they were not very good. The only real good one with memory was still, with the right memory and abrasion-resistant characteristics, was natural gum stock. In this period of time, starting with World War II, synthetics were substituted for rubber, the advance has just been tremendous.

Swent: Did you do that kind of research, or somebody like Holz--

Clarkson: Holz. They had the lab facilities to test the strength qualities, the permanent set characteristics, and all of that. And then those larger laboratories, like Goodyear and Firestone, but their research laboratories were for making better tires and making better belts. Like the Gates Company was a great developer of belts. They were the developers of V-belts. So for all of these requirements, there was lots of research in rubber.

Observing the First Rubber-Lined Pump

Swent: How did you find out about these kinds of things?

Clarkson: Well, we knew about rubber--I did--from mining mill experience: conveyor belts, hoses, and all of that because we worked with Goodyear products for mine hoses, air hoses, Linatex lining for chutes and parts around the mill, and then, in that period of time, rubber-lined centrifugal pumps came into popularity, like ASH pumps Allen-Sherman-Hoff and others. Allen-Sherman-Hoff was the pioneer company in rubber-lined sand pumps.

My milling years, why--my very first experience was at the Idaho-Maryland, one of the Idaho-Maryland mills at Grass Valley. The foremost slurry pump then, the sand pump, we called it, was Wilfley. But they were hard iron, abrasion-resistant iron pumps. There was some rubber used, like in the shaft seal part of some pumps, but very little. When I was working a shift in one of the Idaho-Maryland mills, why, Allen-Sherman-Hoff people came in with one of their first rubber-lined pumps. They wanted to put it in on a test run against Wilfley. I was operating a shift when this pump was being tried. That was probably my first exposure to such a piece of mill equipment that was rubber-lined. That first one didn't stack up very well against the Wilfley. The rubber didn't last

very long [chuckles]. But they, of course, stayed with it until they became the foremost pump people.

And then industrial molded rubber was starting to be used in flotation machines, like the Fahrenwald (Denver) machine and the Kraut flotation machine, which later became Pan American. And then the Galigher flotation machine came along. They had all rubber parts. The impellers and other parts in the cell were made of rubber.

So that was a period of history, mostly in the thirties, that rubber really came into important use in milling equipment. Of course, rubber hoses for the mine hoses--water hoses and rock drilling machine hoses and everything--rubber went back a long time there.

Swent: So your valves had rubber from the very first.

Clarkson: Yes. That started with the cyclone work. And then the cyclone work led to the valve design, of course. So everything other than the feeder, the use of rubber was the heart, a very important part of--all of our designing was based on being able to use rubber as a key part--replaceable parts.

Swent: But then when did you start using substitutes for the rubber?

Clarkson: Well, mine slurries were virtually all ambient temperature. There was no petroleum ingredient. Rubber was by far the most abrasive resistant and the best elastomer with the best qualities.

Swent: The most abrasive-resistant.

Clarkson: But then when we got into other industry--upgraded metallurgical requirements, why, then a lot of research started coming in on elastomer uses, like, as I say, neoprene and chloro butyl rubber.

Keeping Up with Changes: The EIMCO Finlay Loader

Swent: But how did you find out about these?

Clarkson: Well, the rubber people.

Swent: They came to you?

Clarkson: They came to us telling us about their product or making recommendations, just like a fellow like Otto Brown making recommendations for a better way of a metallurgical process or a better, improved design in the equipment {lower maintenance costs}. So that era of "peddlers" was changing into {chuckles} engineering sales people.

Swent: When did you join AIME?

Clarkson: In 1945.

Swent: So you began getting their publications.

Clarkson: Yes.

Swent: You probably read them before then, did you?

Clarkson: Yes.

Swent: Were they of help?

Clarkson: Yes, very much so. I have a lot that I have kept in my files today. Lots of changes started taking place in the thirties in mining and milling, like with EIMCO. Started out as a second-hand machinery company in Salt Lake. EIMCO, like Joe Rosenblatt.¹ His grandfather was one of the early-day junk dealers, a Jewish family in Salt Lake. They got into the steel and foundry business, the family business, then manufacturing. Joe Rosenblatt was recently--I think last year he was elected to the National Hall of Fame, one of the still-living--

I started out as a mucker, and at the same time we started hearing about Finlay--the inventor was a fellow by the name of Finlay, and the story that I knew and heard was that the first company to look at it was Gardner-Denver Company. They manufactured rock drills, Gardner-Denver rock drills and air compressors. They looked at the Finlay mucking machine. They said they could never make it; it would put too many muckers out of jobs. Then it was all hand mucking, and this guy figured out a way to do it better underground with this overshot mucking machine. They turned it down. Then he took it to EIMCO. It first was known as the EIMCO-Finlay mucking machine or loader. That was the beginning of their manufacturing. Then they went into building filters, concentrate filters, (vacuum filters), and other milling

¹See ROHO interview with Joseph Rosenblatt, cited p. 171.

equipment. And EIMCO--the name still exists, but it's owned, like Denver Equipment Company and I think Mine and Smelter, Allen-Sherman-Hoff, and Galigher. They're all owned by parent companies now. I can't keep up with all the names. But those early names--Wilfley is about the only one that exists as a family corporation.

Swent: And Clarkson. Don't forget Clarkson!

Clarkson: I'm talking about the older. The Clarkson is a Johnny-come-lately [chuckles].

Swent: Well, it's been around for two generations now.

Clarkson: Time flies. {nearly 50 years}

The T-Valve: For Tailings Distribution

Swent: What was special about the knife-gate valve?

Clarkson: Well, it's strictly a shut-off valve. It took a lot of experience and thinking effort to make a successful valve out of it, getting just the right formula of elastomers for the various applications. It was taking on a pretty tough application problem, really.

Swent: Tell about it.

Clarkson: Well, there was one other valve that I got a patent on, too, that we called a T-valve. I developed it for tailings distribution. It was designed with rubber lining to protect it and so forth, but it was--early on--was--the principle was called a dart valve. It was developed--it really wasn't a valve. It was just a stopper. I took the principle and developed it into a valve.

In the Iron Range country, like in Hibbing [Minnesota], Oliver Mining started pumping some of their pit wastes out long distances in miles, up to the waste disposal areas. They built the pipelines to follow the contour of the land, and there were low places in the course of the line, and being in a cold climate and also pumping a heavy slurry, the low places, they developed a way if the power went off on the pumps that they could automatically drain those low places in the pipeline.

It was a cone-shaped {hence the name--Dart} plug with just a nipple in the bottom of the line and then a yoke that held the plug that went up around the line; and on top of it, it was held shut by a solenoid valve. That was entirely an instrument valve. When the power failed or went off, why, the solenoid let the plug drop and it automatically drained the line. And when the power came on, the solenoid valve would pull the plug back up and shut the line again. So it didn't require someone to go out there and drain each section of the line.

Well, I took the cone plug principle and put it in a housing to be lever-operated. All these were rubber, molded parts that made it. The plug, the conical-shaped plug was closed or opened by a lever. It wasn't an automatic deal; it was a manual valve. That's why I just utilized that principle of a cone-shaped plug and put it in a housing and a design for the lever and so forth, and there was no other valve like that had ever been designed. {Also sometimes we used a cone-shaped plug instead of a ball in the reagent feeder float valve--a similar principle with a float instead of a solenoid.}

Swent: Someone had to go and push the lever.

Clarkson: Yes, to close it or open it.

Swent: How did you know about this valve in Hibbing?

Clarkson: Well, when I was working for Bradleys I had the job of designing a new tailings pumping system, so I was sent back along with Harold Bailey, the then manager, to study some of the methods and get notes, information about how these long-distance pumping systems worked. And we visited the Iron Range {Hibbing} country, where pumps were being used to pump the waste out. And then we went to Ottawa, Illinois, where the silica sand operations--where they were hydraulic mining the silica sand and then pumping it to the storage areas for sand, where they loaded it into rail cars. I got a lot of my education and experience from being assigned--having a project and going out, finding out how others handled similar projects.

Swent: So you sat on that idea for twenty years.

Clarkson: [chuckles] Probably about that.

Swent: Before you did it yourself.

Clarkson: So it stuck in the back of my head. Same way with even developing the new rod mill procedures. I went back to find out how rod mills had been used in earlier years. {Tennessee

Copper was one authority source on rod mills. Another source, one was used to make sized sand in aggregate for the Shasta Dam project.)

The Knife-Gate Valve

Swent: So this T-valve was before the knife-gate valve?

Clarkson: Yes. It was before. Then the knife-gate valve. It also started out as a tailings valve, mainly used on the distribution for impounding. And it was lever-operated, and just small valves, three- and four-inch size valves. The first knife-gate valves were also just lever-operated, small valves. That's where Curt came in and started to improve on it and make them larger and all of that--{a development project for a young engineer!}

But the T-valve, the so-called T-valve, it had some--we found some good operators that liked it, but most of them had too much debris coming out with the tailings, like chunks of rubber coming from worn-out parts in the flotation machines and pump, frequently plugging the valve up. The knife-gate valve was a full-open valve, so it really--the T-valve was an effort to solve the tailings line distribution valves, but the knife-gate valve proved to be a better, more practical design. But then it required a lot of experimenting to get the rubber parts just right and other design features to make a larger valve. So it got bigger and bigger. {Sometimes they were called guillotine valves.}

Swent: How large are they now?

Clarkson: Forty-two-inch.

Swent: That's your largest.

Clarkson: It's the largest. That's a pretty big hunk of machine. But, like, our R&D crew, they're researching and testing all the time to get more sophisticated and come up with a new product line {in our area of expertise}. It's a niche business, as we have said a lot of times before.

Swent: So the first ones were three inches, you say?

Clarkson: Two and three and four. Four-inch was the largest size in the C-valve, too. They got too cumbersome. Then we got up to a

six- and eight-inch and then finally a ten-inch, but in those designs most of the requirements are in the smaller sizes. {Problems to solve also in rubber formulas for the required elasticity.}

Swent: So eight-inch is now the maximum size for your C-valve?

Clarkson: The C-valve, yes.

Swent: And forty-two for--

Clarkson: The knife-gate valve.

Maintaining Competitiveness by Knowing More about Rubber

Swent: And when the size changes, does the material change also, or are they essentially the same?

Clarkson: Well, design features have to change. And, of course, research is always going on in just little design features, the rubber molding, the rubber formula. That's why we keep moving more of our rubber work in-house because we try to keep our rubber formulas away from our competitors. We know more about rubber than they do because they use commercial-formula rubber and so forth, and the commercial molders, the big ones, they don't give out their formulas, either. We sent our people, engineers, back to the rubber capital, Akron, Ohio, for seminars and for upgrading their education on rubber methods and all of that. So that's one of our competitive advantages that we try to hold, is that we know more about rubber than our competitors do. For that particular application.

Swent: When you moved your plant from one side of Palo Alto to the other, what was the change other than just location? Were you doing more fabrication in your plant?

Clarkson: Yes, more room. And we consolidated it all in one building.

Swent: The fabrication and--

Clarkson: All the machine work.

Holz Rubber Company

Swent: You were still buying your supplies--

Clarkson: We didn't have any in-house rubber work then at all. Holz always remained our major supplier. We tried some work with another rubber company in San Jose and also with Goodyear in their facility in San Francisco. I think the San Jose rubber company is still there. But they were more specialized in baseboard moldings and rubber floor tile and things like that. So we would try some of these outside people, but then we would always fall back on Holz. (We sometimes gained some useful knowledge from their labs.)

But in the course of all those years, Holz changed hands three or four times, but some of the management always stayed. By that time, we were a major customer of Holz, and so they always made a special effort to try to keep us as a customer. But Bill Holz, when he first sold the company, why, he stayed on for a while as a consultant, and then--but it wasn't too long after that that he died. But the different ones that carried on, we--

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Clarkson: --had a good relationship, as we do today. The fellow that-- his staff, that heads up Holz under its present ownership. We work very closely with them. And there is one other supplier that is stronger in the synthetics. Their company is in Oregon. We do some business with them.

Swent: I thought you got something from Texas also.

Clarkson: No, that's all foundry, essentially all foundry work from Texas. I don't think we have any rubber-molding activity--I can't always keep up--

Swent: You get something from Texas.

Clarkson: A lot of foundry work from Texas, yes.

Son Curtis Clarkson Comes in as Chief Engineer, 1967

Swent: When Curt came aboard, then, did you change the organization at all?

Clarkson: No, not really.

Swent: He came in as an employee only?

Clarkson: He came in as chief engineer.

Swent: Was he replacing anybody?

Clarkson: No, not really, just with growth. All these hats that I had been wearing [chuckles]. He started doing things that I was getting too burdened with and helping, taking--he was essentially taking over a lot of things that I had always been doing, relieving the load for me and taking charge of the work that--took some off of my back or off my shoulders, you might say--{bringing in modern thinking too and helping Dad!}

Swent: So how did this come about? Had you always intended to bring Curt in?

Clarkson: Well, that was naturally my thoughts. But during his school years, even starting--Curt, even when he was ten years old, even in 1950 in Boise, why, when I'd go down to our little shop and do work, he was out of school, of course, and it was the summertime, too, why, Curt always loved to go along with me, even on quite a few of the flying trips. And Stibnite, why, if Curt was not in school, why, he would get to go along with me to Kellogg, to Bunker Hill or to the Ima Mine or to Boise-- {later on, even with a load of feeders for Anaconda}.

Swent: I love this picture you sent from, I guess, from the newspaper or from a mining publication of his attending the ALME convention with you when he was just a little boy. He must have been about ten at that time.

Clarkson: Yes. So Curt got to do that. Claudia, of course, being a girl--

Swent: You never thought of taking her along, too.

Clarkson: She got to go on trips, social trips, like a fly-in-- {gatherings, others like to Boise and even Spokane}.

Swent: I noticed she didn't go to the mining convention.

Clarkson: She usually had things to do at home with neighbor friends and school. Curt was the one that got to go. And then after we moved to Palo Alto, Curt would do things down at the shop whenever there was an opportunity, and then too he got to have a job for some of his high school classmates.

Swent: But he had a good job with Asarco.

Clarkson: Yes. Well, that was during his college years.

Swent: After he graduated, too.

Clarkson: Then, after graduation, back to Asarco. Then he was drafted, and he came home.

Swent: Yes, we have talked about that.

Clarkson: A good friend, Norman Weiss, headed up all of the Asarco milling operations. I would see him every once in a while at a meeting or in Tucson, where the offices were. One day, I think was after Curt was back out of the army and back to work for Asarco, Norman said, "Are we just going to get Curt trained for our work and then you'll steal him from us?" [chuckles] And I smiled but I didn't really say anything. That's the way it happened. Well, Asarco was making some changes and so forth, and so we discussed it that it was a good time for Curt--I needed help.

One of the fellows that had been working was a young engineer, Milt Barnett. He was offered a mine job for I don't remember what company now. He wanted more mining experience, so he quit. That happened when we started to think it was time for Curt to come in. After that, Barnett went to a Latin American job. Was down there quite a long--I've lost track of him now. I haven't heard anything for several years. But Curt took over engineering work that he was doing.

Swent: Did you have to urge Curt to come?

Clarkson: No, not really. He felt he would like a change, too. I think at that point he wanted me to invite him to come. He didn't want to ask for it.

Swent: Where did the initiative come from?

Clarkson: Well, watching for an opportune time, and the opportune time came. And his family was getting started, too, with the girls. Palo Alto schools were pretty attractive at that time, too. And the cost of a home in Palo Alto was very, very reasonable at that time, too. So, as I say, it was an opportune time. So several facets of it that we took advantage of pointed the way. {Coming home!}

Swent: Did you hire him as an employee, then?

- Clarkson: Yes, yes. And then he became a member of the board of directors. This fellow that was a banker in San Francisco back in our early years, back in the fifties, he came out from New England area. He was manager of the little Crocker branch bank on Colorado and Middlefield Road. We were doing some banking there, and he became manager of that branch. So our friendship grew. Warren Kelleher. In the headquarters in San Francisco, he was the industrial loan officer. He became a vice president there. And we, through all those years, we became good friends. He was not on the board of directors then, but he was quite a good banking advisor when we were planning the new facility and so forth. And then when Crocker merged with Wells Fargo, he retired. And then he became one of our directors. Warren Kelleher.
- Swent: So who was on your board then at that time? You, Curt, Lee Aplin, and Warren Kelleher and--was Art Norman still a director?
- Clarkson: Yes.
- Swent: And your brother-in-law.
- Clarkson: No, he was in Vietnam in 1967 and did not come back on the board until the mid-eighties. But Bill Holz was serving at that time.
- Swent: Bud Wilson came along sometime.
- Clarkson: That was after, after he retired, and after we moved over here to Sparks.
- Swent: So that's fairly recently that he's been on your board.
- Clarkson: Right.
- Swent: Nobody from Utah had been on your board before?
- Clarkson: No.
- Swent: So Curt joined you as a director and as your chief engineer.
- Clarkson: Yes, and then he became president when I stepped aside to become chairman. Then he took on more--
- Swent: We're going to go on to that in a minute, but I wanted to--did you have any discussion with your wife about his joining the company?
- Clarkson: Oh, yes. Edna was real anxious for that, to get the family over to Palo Alto, get the grandkids. Of course, we were

taking him away from the other grandparents over in Tucson. But then, when they retired, they moved to Palo Alto, too, so they got to enjoy their--

Swent: Have you had any thought of getting Claudia involved in your company?

Clarkson: Well, no. She was more interested in being a home mom.

Swent: One of Curt's daughters.

Clarkson: One of Claudia's daughters and one of Curt's daughters each are on the board of directors. So the company periodically--the company essentially has been transferred to our kids.

Swent: Claudia has not been involved?

Clarkson: Not in company--{but in P.R. activities.}

Swent: And you hired Omer [King] when you moved over here, didn't you?

Clarkson: No, before. No, he was hired in December 1981 when he had reached his retirement time with the state of California, they could move to Palo Alto. He retired a year later from the U.S. Air Force Reserve.

Swent: He's your son-in-law, we should say.

Clarkson: And also became--because in all the company transfers, there's a yearly gift to Claudia and to Omer, equal gifts of company stock, went to each, Claudia and Curt. But these company stock transfers were always just to Curt and to Claudia, not [chuckles] the spouses, because that was always our--Bud {Edward} Chandler, our long-time corporate attorney in San Francisco, said, "You don't expect any of this to happen," but he said you could--divorces and deaths and various things like that--he said, "You might save yourself a lot of legal problems by just transferring to the child."

Swent: Did you ever have any concern about the possible hazards of having your son come into the business?

Clarkson: Well, I don't think I've said much about this before.

Swent: No, we haven't talked about this.

Clarkson: That was one of the things that sometimes came up, especially the younger son's interest. Dick Krebs had two sons. Kelly Krebs once told Curt when he was in college--Curt showed that

he was interested in having a big part in the future of the company, and Kelly in effect told him to forget it, and then one time later I picked it up, that Dick stated that as long as he was a part of the company, that Curt would not have a position of leadership. None of the Krebs children have ever been active in it at all. Even today, when we were in--Curt and I had a meeting when we were in Florida with the current president of Krebs. There's no Krebs children that ever--we were talking about what might happen to Krebs in the future. He said that none of the children had any involvement in the company, except probably for family stock. {Neither did the company ever have any outside directors on their board.}

And the other thing about that is that they--when we separated, the cyclone was really becoming a money-maker. It was just easy sailing, rolling in good profits. They built up to where they had a tremendous cash reserve, and substantial stock incentives were given to the presidents and some top employees over a period of time. Most all of them on retirement--I think all but one--cashed out their stock. And he told us at this time that their biggest problem had been all of the pay-out on stock buy-back.

Swent: That has happened to so many family companies, hasn't it?

Clarkson: Yes. I don't feel wrong in saying this--when the two brothers and I, the third, went into partnership, I leaned over backwards always to keep from muddying up the waters when there was any dissent. I wasn't the one to bring about the split-off. One of the presidents, the next one after Art Norman, made a pretty strong effort to bring us back into the company so that Curt would be in a position to head it up. By that point in time, Curt had pretty well shown his ability--because the word of mouth coming back from mutual friends and companies that we did business with and so forth--that was music to my ears--

Swent: Of course it was.

Clarkson: --that they would like to have us back.

Swent: You have done wonderfully, and you and your son and son-in-law certainly seem to have a wonderful relationship.

Clarkson: Yes. But some of those things don't really need to be in the story. {Well earned satisfaction from team work. Key employees were always a part of our team--the whole team!}

Swent: No, but they can be implied between the lines. So it was, I gather, a pretty harmonious relationship from the beginning.

Clarkson: Yes.

Swent: Have there been times that you've had differences of opinion about what to do with the company?

Clarkson: Well, we've had lots of approaches, some of no interest at all, to buy out the company. And even today, why, we have some pretty deep discussions about how to figure the future, with mergers. And we do get today legitimate companies--we get approaches for buy-outs and things like that. Now it's to the point where the young people will have to make those decisions as time goes on and how the economy runs and all of that. We have a good, strong position, but you never can outguess everything for the future.

I always say that I'm very fortunate because to still be around, you have to be in the hands of God to--just like what happened to the Bradleys, that could have happened to me a lot of different times. What happened to Tony, what happened in the Utah organization. So if something happened, there is a lot of opportunity that something could have happened to me that would have changed the whole course of company events. So I think you do have to reflect on some occasions.

Swent: What we always think of around Oakland, of course, is what happened to the Kaiser empire, which just collapsed.

Clarkson: The family--people you know--we know what can happen. If it turns out good, why, that's wonderful. Sometimes things don't turn out as well.

Swent: Have you and Curt ever differed on what direction, moves that you should make?

Clarkson: That I should make?

Swent: No, in your company. Have you and Curt had differences of opinion?

Clarkson: We try to maintain excellent communication with all of our people.

Swent: I mean you and Curt.

Clarkson: Well, Curt. We discuss it sometimes. I approve or I disapprove of some--I express myself that way. But then we

usually come to the best choice or what we think is the best choice, and at the same time, we're very strong--Curt is as strong as I am for protecting the interests of people that help us to make it a good, going company. Then it's a real hard decision sometimes, when you have to change the course. Like, people that we have changed, like Hank's predecessor, it was a hard decision.

Swent: This is Hank--

Clarkson: Hank Frohlich, vice president-marketing.

Outgrowing the Palo Alto Facility

Swent: We haven't talked at all about your move from Palo Alto. I think it's time to talk about that.

Clarkson: Well, we started thinking about it--our new facility in Palo Alto we figured would be good for at least ten years. By seven years, we were starting to get pretty confined. We could see that it wasn't adequate. Then business was good. We had to start renting some extra storage space, and that was awkward--the building was a mile away, and it was inefficient running back and forth between the places. That was when the cost of living in Palo Alto started escalating, and some of our employees were living farther away. Why, then we started thinking what are we going to do next. Our thought then was to move to a better location.

Swent: This was in the middle eighties.

Clarkson: Yes--early eighties.

Swent: Curt had joined the company in '67, so he'd been there fifteen years.

Clarkson: Yes. And Omer had been with us about four years then, by the time we moved.

Swent: And your main production, then, was your knife-gate valves. And you were doing more and more of your work there, in-house.

Clarkson: Yes, most all except rubber work and foundry work. Everything else, except for buying manufactured accessories, was done outside. It was evaluated and discussed and everything, and

then I started looking and considered the places that we might move to.

Swent: What were some of them that you considered?

Clarkson: Well, in California, moving out of the--maybe to the Woodland area, Sacramento area, Tucson, Denver, Salt Lake, Boise and Portland, then Reno, of course. And then the labor market, taxes, and location was all a part of it. I made trips and Curt made trips to kind of size up the different places. Everything kept pointing more to Reno and Sparks all the time.

Swent: Did you hire an outside advisor on this at all, or did you do it all yourself?

Clarkson: No, not really. Except outside, some of our customers, like people in Tucson, our reps--we had a good rep organization. And even some of our people then, they had their input on areas they would like. So all of that influenced.

Swent: It was an open secret, then. You weren't keeping it--

Clarkson: No, it was well talked of among employees. Different employees had vacation trips to different areas like the Northwest, and Tucson, Phoenix, those places. They would express their feelings or thoughts about certain places where they would like to be. And some even looked into the cost of homes in some of these places. So it wasn't drawn out. We just started working and kept working on it until it took shape and a decision was made.

Swent: Who made the final decision?

Clarkson: Well, I think it was a group decision. But mostly a family decision at that point. But then that had to be presented to the board of directors, and they had their input. It wasn't just--it wasn't an easy decision, but it turned out to be a real good one.

Swent: You feel good about it.

Clarkson: Yes. Virtually everyone that was involved in it accepted it wholeheartedly and pitched in.

VI CHANGES IN MANAGEMENT, MOVING TO NEVADA, 1980-1998

[Interview 6: April 13, 1998] ##

Swent: This is interview number six, at the Clarkson home in Reno, Nevada, April 13th, 1998, the day after Easter and a nice little snow shower is falling on your beautiful plum blossoms outside. It's a nice bright day, there is a fire in the fireplace, and we're going to continue with our next interview.

Curtis Clarkson Becomes President of the Company, 1980

Swent: Let's begin by talking about when Curt became president. He had been your chief engineer, and he was a director and then March 10, 1980, was when he became president.

Clarkson: Well, starting with engineering, he got well familiarized with all of that and starting putting in his experience into engineering, looking to the future. From the engineering, then on into the presidency and CEO.

Swent: Did you have some sort of ceremony when he became president? To make a big thing of it?

Clarkson: No, I don't recall that we did. It was mostly a board meeting announcement that he was taking on the additional duties from his engineering work. Of course, we sent out announcements to our reps and others that the company was associated with. We had by that time pretty well built up our rep organization. Curt at that point made trips, along with our then-marketing/sales manager.

But Curt was already pretty well known among mining people because of his activities first working for Utah at Riverton, {Lucky Mac, Shirley Basin} Wyoming, uranium work and on the various jobs that he had with Asarco.

Swent: When did he work for Utah?

Clarkson: It was in 1957. Just after high school graduation--{Paly High (Palo Alto, California)}. It was a summertime job. As soon as he got out of high school class, why, I arranged for Curt a job and one of his classmate friends. They took off in Curt's Chevrolet car to go to Riverton. Of course, Curt already knew people because there were former Stibnite people on that job there, too. That was his first summer of mine work. But he was not inexperienced because he really grew up to teenage in mining camps.

At Stibnite we gave the boys and girls jobs, too, to keep them occupied. The way that was done was through the Scouts and the like, and the mothers. The mothers had to supervise. But to do clean-up jobs around the mining camp after the snow was gone, clean up the trash, cut some of the brush, and projects like that.

Swent: They were not very high-tech jobs.

Clarkson: [chuckles] No, they were all sort of laboring jobs. {They called them contracts! All under the supervision of the village fire chief--he was also assistant personnel manager.}

Swent: Curt became president after you moved to Reno?

Clarkson: No--he became president in 1980; we moved to Reno February 1986.

Swent: You had said that Omer [King] was the one who did most of the research on the move.

Clarkson: Yes. {He joined the company December 1981.}

Son-in-Law Omer King, Vice President-Administration

Swent: We have not yet said much about Omer, but you had mentioned earlier that he had retired from the State of California and also from the army, I believe.

Clarkson: From the air force, U.S. Air Force Reserve.

Swent: What did Omer bring to the company when he joined the company? What was his role?

Clarkson: He was a program manager for the California State Water Resources Control Board. That was his last before he retired. But his function was mainly personnel.

Swent: Was he trained as an engineer?

Clarkson: No. His degree from Cal Poly was soil science, B.S. in agriculture. Of course, that led into the water part of it in the state, but his work was with contracts, like levee jobs and river water control and so forth, dealing with the contracts and I suppose even some other legal functions and personnel in the Sacramento offices. The personnel and that sort of the thing was the big--well, his military experience, too, because in the air force reserve he was a supply officer, and he had some special activity at the academy in Colorado and to Alaska. It all dealt with air force supply, moving supplies, and he was pretty closely involved with McClellan Field in Sacramento, which is a supply base.

Swent: How had he met Claudia?

Clarkson: When he was in school, at Cal Poly, and she was a senior at Palo Alto High School. I don't remember the exact detail, but it was at some of the school functions that they met during that period. And they were married in August 1955, before he graduated. Cal Poly was then not coeducational; it was an all-male school.

Swent: That was at San Luis Obispo.

Clarkson: Yes. The year that Omer graduated {1956}, that was the last year that it was an all-male college.

Swent: So you had known him for a long time before he joined the company.

Clarkson: Oh yes. We had a lot of opportunity to know him, his parents, and family.

Swent: What was his assignment, then, when he joined the company?

Clarkson: Personnel.

Swent: Personnel manager?

Clarkson: Vice president-administration, like insurance, hospitalization, safety, just about everything that involved personnel. Profit-sharing and bonuses and all of that. Before we decided and made the move, Omer did a lot of the footwork on dealing: property prices, property location, taxes, and various state things that would have an influence on our operation, even

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The Man Behind the Benefits

Omer King was born in Stockton, California and grew up in Alameda. He graduated from Alameda High School in 1952 and headed for Cal Poly at San Luis Obispo where he majored in Soil Science. Omer graduated with a BS Degree in Agriculture and a commission in the U.S. Army in December, 1956. In August, 1955, he and Claudia were married so she could get her PHT Degree (pushing hubby through). They tell me love had something to do with it too.

Following his graduation Omer had a year of transition which included starting a job with the U.S. Soil Conservation Service, bringing daughter Kristi into the world in April, 1957 and then that summer heading off to Basic Field Artillery Officers' School at Fort Sill, Oklahoma where he would be for six months. In December, 1959 he left the U.S. Soil Conservation Service and joined the California State Division of Soil Conservation. Daughter Karen was born in March, 1960.

With all this behind them Omer and Claudia were ready to settle down to normal family life, but there were still changes to come. In April, 1965 Omer transferred his military commission to the Air Force where he completed a distinguished career in the Reserves as an Air Transportation Staff Officer at the North American Air Defense Command in Colorado Springs and retired in December, 1982 as a Lt. Colonel. In September, 1968 the State Division of Soil Conservation was closed and Omer spent the next 13 years in various positions in California State Government including Personnel Officer for the Department of Conservation and finally Chief of the Division of Administration of the Water Resources Control Board. Omer joined The Clarkson Company in December, 1981 as Vice President of Administration.

What could be more interesting about Omer?

His hobbies include history in general but mostly military history, collecting toy soldiers, military arm patches, reading and HO gauge railroads. He is an Eagle Scout. He worked his way through college in part by delivering mail during holidays. Omer climbed to the top of Mt. Whitney the highest point in the lower 48 states.



INTERNAL AUDITS

Look out the Internal Audit teams are on the move again. The teams have been changed around but still consist of the same group of auditors. This change was done to facilitate a new perspective for the audits. The good news is that we have decreased the audit cycle to once a year for most departments. The audit cycle will start in August and be completed by March, 1998 for all departments. Roland Kelly of NSAI will be conducting his external audit on November 5th.

WHO DID WHAT - WHO WENT WHERE???

Summer is traditionally a time that people take vacations and try to convince themselves that it is really a rest. Most of us, however, are ready to come back to work to rest from the vacation. Here are some of the things that Clarkson associates did on their vacations:

Disneyland was a big hit this year. Frank Pia, Brian Kagele, Mike Murphy and Carol Beeson all braved the crowds and headed to Southern California. Marine World/Africa USA was visited by Carolyn Henry and Anjanette Funkhouser. Carolyn also went to Calistoga and spent her time visiting wineries, mud bathing and getting massages (this woman knows how to vacation). Houseboating on Lake Shasta also seems to be a popular activity. Evelyn Littlefield, Steve Thomas and their families and 14 other friends(?) spent several days on the lake. Robyn Hensley is going to Lake Shasta with her family the week of September 15th to experience houseboating. Valerie Jochimsen spent her time getting ready for the marriage of her oldest daughter, Lori. Carol Beeson sent her son to camp and vacationed in her own home — ahhhhh, solitude!! Jamie Carpenter spent her third year at "The Burning Man". Any further info has to come from Jamie herself. Mike Lange and Gayle Turk hung around their home, but also made a few bike trips and just went here and there. They visited several museums and art galleries that they had been wanting to see. Sharren Lombard spent her vacation in the beautiful state of Colorado, where she visited with her son, her in-laws and spent time with some old friends. Jay Miller golfed, golfed, golfed, and then he golfed some more, but never won. Poor Jay Ray Jakubik golfed some and mixed concrete. He never said what for, but he did say he only mixed it when it rained. Kim Lefferdo forced herself to vacation in Hawaii. The Balloon Races are a standard yearly vacation for Hank Frohlich, Koh Murai and Randy Kirkpatrick who is a crewperson for Koh. (Not quite sure how you can consider getting up at 2:30 in the morning a vacation!) Erick Edge, we are told, spent his vacation backpacking and fishing. Didn't hear whether he caught anything. Matt Delongchamps went to Phoenix for the first meeting of his future in-laws. (Bravery or naivety?) Deer hunting is always a favorite for Clarkson associates - Jeff Bernardi, Leonard Smith, and John Sharkey all have deer tags for this fall. Bobby Mills went to Stampede camping and stated he had the "Camping Trip from H___!!" His daughter was most helpful and took good care of her dad. Mark Kutz spent a week in Fort Bragg, California. He's another one who knows how to vacation. Denise Ulving spent a week at Lake Almanor with her family. She did seem more relaxed when she returned. Lourie Norman went to her nephew's wedding in what she refers to as "Hot and Sticky" North Carolina. She states she will never again go in the summer. George Lacombe went to Buena Park, California for the Bobby Sox Nationals. His daughter's team placed 9th out of 31 teams so George has a right to walk around with his chest puffed out.

Joanne Dickson dragged herself onto a cruise ship and went to Catalina, Ensenada and San Diego. She did say that she could become very use to being pampered. John Blackburn said his was just filled with company. Larry Koll had a family reunion at Davis Lake and did some bicycling there. He also went to Alameda and went ocean sailing. Jerome Waldman had a family reunion at Comanche Lake, California. Dave Machen went camping at Davis Lake.

Epi Perez is planning to travel in October. He didn't give out too many specifics — uhmmmm. John Moser plans to go to Mt. Lassen and do some hiking and relaxing. Somehow, those two words don't seem to go together. Louis Lawson is going to Disneyworld in Florida, and then he is going to New York City.

Some associates have not taken any vacations yet and don't seem to know exactly what they are going to do. Maybe the above list will give some ideas to those who are undecided

financing the move with--industrial development bonds were available in Nevada then, and Omer negotiated all of the requirements for making use of industrial development bonds, low-interest bonds, provided low interest for the property investment.

Swent: This is from the state of Nevada.

Clarkson: Yes. All of the paperwork was with state facilities.

Swent: Did you buy the bonds or sell them?

Clarkson: No, the bonds were provided for us. The bank bought the bonds, the bank that handled the bonds, like, then, First Interstate Bank. They took the bonds and provided money for the lot purchase. Then we--like Omer calls it--our "sacred cow" was our property in Palo Alto, which we owned, and we leased that out. Of course, that provided a pretty nice income.

Swent: Sacred cow or cash cow?

Clarkson: Cash cow. It's a better term for it. I think we did call it sometimes the sacred cow. But that's really what it was, our cash cow. Then we just sold that property last year when our lease periods ran out, and we had a good opportunity to sell, so that was done.

Swent: So the state issued the bonds, and the bank bought the bonds, and then you borrowed money from the bank.

Clarkson: They were industrial. It was a means of promoting industrial development here. So all of that was researched and negotiated. And then when we got through all of that, we had the same architect that I had in Palo Alto. He was a young architect with his own firm in San Jose.

Stanley Gould, Architect for Two Clarkson Plants

Swent: What was his name?

Clarkson: Stanley Gould. When I was making plans, when we were getting forced out of our old facility in Palo Alto, I was one of the early members, I guess, of the Peninsula Manufacturers Association. The association had regular meetings. He was at one of these meetings, looking for business. I got acquainted with him and liked him. Liked his specializing in industrial

development; he was in his beginning years, so he was hunting for jobs, beating the bushes.

So when we got to the point of the new building, why, I engaged him to do our architectural work on the Bayshore building, and he did a good job for us {negotiating with the Palo Alto Architectural Review Board and building contractor-- Rudolph & Sletton}, so then, when we got through our plans over here and planning a new building, by that time he knew my likes and dislikes, so he made a study of the ground that we had here and the building requirements and so forth, and he planned all of our new facility here for us, did the costing and all of that for it.

One of the First Concrete Tilt-up Buildings in Palo Alto

Clarkson: Our first main building in Palo Alto was one of the first concrete tilt-up buildings built in that area. We liked it and we got to know the first builder {Carl Holvick Construction} real well {but we didn't use his firm for our new Palo Alto building}. Too, having used the building through the fifties, sixties, I recognized the features of it that I liked and disliked, and so that had an influence on planning for our next new building, which was also a concrete tilt-up but much improved over the first one. {Rudolph & Sletton were the building contractors.}

Swent: What were some of the changes you made?

Clarkson: Well, I didn't want another concrete building mainly because of roof problems, even though we had with the second building-- well, a near-flat roof that was always--they improved on the materials and design features a lot over our first one, but still the hot sun there and then when going into the rainy season, why, there was always a job finding the new leaks and repairing.

Swent: What about the sun?

Clarkson: Well, the sun caused this. The summer sun on a built-up roof-- tar, asbestos or fiberglass type of roof--the heat expansion and then shrinkage with the cold weather, cracks and crevices that would develop in it. But at our original site, our main building was a concrete tilt-up building, but the first building, the older building, was a steel building, a Butler type with pitched corrugated iron roof. We didn't have any of

those seasonal problems with it that we had with the flat roof and the concrete cracks from an earthquake.

Planning an Economic Steel Building and Roof

Clarkson: Coming in to this climate, where there's a much greater temperature swing to deal with, insulation and ventilation and everything had to be considered. Well, I put some of my experience for building construction into that. I very definitely wanted a steel building with a more sloped roof, rather than a flat roof. Here, the concrete for our inside working shop/warehouse crew also would have to be insulated. We didn't need that in the Palo Alto climate. We just had the bare concrete walls inside, too.

So at first the negotiation--the steel building was seemingly quite a lot more expensive than a concrete building because that's more the typical construction here. But Omer and the architect and Curt, all of us kept working on it until we got the steel building so it was on a par with concrete.

Swent: How did you manage that?

Clarkson: Well, the difference in cost of insulating and other interior structures--the overhead cranes--were more adaptable to steel structure than a concrete structure because steel columns and so forth had to be designed, stressed, and so forth, to carry all of the overhead. So when all considered from that planning effort, why, it showed that we could do the entire steel structure at a cost on a par with a concrete tilt up.

Swent: What is the roof of your present building?

Clarkson: It's a steel roof. But it's a sloped roof. It has good drainage to it. Even here, a roof has to be pre-stressed and calculated for a given snow load because heavy snow can occur here at times.

Swent: What is the cladding of the roof? What's on it? Is it still asphalt?

Clarkson: No, no, it's steel, painted. Steel is treated, too, galvanized, things like that, for longevity. A roof like that doesn't need to be replaced for years and years, where built-up roofs and asphalt and that type only have a ten-year life; then they have to be resurfaced or replaced. On a steel roof, it

just lasts. After about ten years we put a new coat of paint on it and painted it white. Aluminum was quite common, but painting white is even better for heat reflection, sun reflection, than the aluminum. So that painting is just about the only type of maintenance on it.

Swent: I didn't look at the roof. Is it just big sheets of steel or is it made to look like shingles?

Clarkson: Well, it's a formed roofing. You're very familiar with corrugated, especially for snow country.

Swent: Right.

Clarkson: But this has a little different pattern. The lap areas and then a flat section, but in sheets, just like corrugated {roofing, sky light section sheets are also made to fit in-- fiberglass.}

The Layout of the Plant Evolves with the Company

Swent: I would like to talk about the interior plan, the layout of your buildings and your offices. Have they changed at all?

Clarkson: Oh, yes. Almost every day [chuckles].

Swent: And how has that reflected your company?

Clarkson: Well, everything except what we store outside is in the warehousing, shipping, receiving sections. All of that is inside. But our first shelving design was with a mezzanine, where employees had to run up and down stairways to the upper mezzanine shelves, and so, as the needs increased and faster ways of doing, all that was taken out, and the shelving was continuous clear to the roof.

And then we went to picking systems, with forklifts that went way up there and picked the crates or the pallets off the shelves. That eliminated the stairways going up to a mezzanine.

Computerization and Materials Requirement Planning Reduce Inventory

Swent: When you had the stairways, did people just carry stuff in their hands?

Clarkson: Well, they could stack it--load up a pallet where the forklift would pick it off the mezzanine floor, and things like that. But there was a lot of hand-carrying, too. Of course, real heavy parts would have to be stored on the floor, on pallets and such. But then that change came along with computerization, or MRP (materials requirement planning). That went out to the certified vendors like for castings, molded rubber parts, and fabricated steel.

Swent: Lead castings you said?

Clarkson: No--steel and just castings, foundry castings. Various kinds of steel, iron and aluminum.

Swent: Did you say light casting?

Clarkson: No, heavy castings on the floor or outside.

Swent: Heavy casting, okay.

Clarkson: Light ones, small ones--they went up on shelf storage. But with the computer system upgrading all the time, we cut down on the requirements of lots of inventory because with certified vendors, they were informed of needs, and parts that were ordinarily required to be kept in inventory would come from the vendor when we were ready for them, and then such parts went right into production. That cut our inventory way down. With the computer control, informing the vendors what our needs would be, they could produce in advance, have a shipment of casting or molded rubber parts ready so that when they shipped, why, it didn't have to go up on the shelves. It went right into the pipeline. That was a great space saver.

Swent: Of course. I'll just throw in here the statistic that your son gave me at one point, that in 1986--that's when you moved to Reno--you were doing \$6 million in sales and you had \$1 million in inventory; and in 1997, at the time that he gave me this figure, you were doing \$23 million in sales--four times as much, approximately--and still only \$1 million in inventory.

Clarkson: Yes, right!

Swent: So you quadrupled your sales and kept your inventory steady.

Clarkson: That's what I was trying to explain. But changes had to be made in the interior, mostly in moving machines around from the old machine-shop-type arrangements and machines updated, too. They were grouped thus. We called it a machining cell.

Manufacturing in Cells Makes Shorter Runs Possible

Swent: Yes. You now have your workers doing this cell manufacturing. How did that come about? What were you doing first? What was the progression?

Clarkson: Well, like inventory, the old machines that were not computer-controlled, they had to be set up by hand, and to change the setup for another part, why, sometimes it would take a shift to change the tooling. So in order to economize, they made larger runs. Say a hundred parts of one kind or two hundred parts, with the new numerically-controlled machines, where they could change the tooling within a matter of minutes on the computer, so then it was practical to make short runs--that was accomplished in a so-called machining center.

And the change from the old master machinist and tool makers and so forth, then they became machine operators because the program was all computerized, and their job was just to change the parts in the machining operation, clean them up and so forth. So there's always a continuous evolution in the shop to update the methods so that everything is flowed through and out to the customer.

The Peninsula Manufacturers Association, Before Silicon Valley

Swent: You mentioned that you were an early member or a founder of this Peninsula Manufacturers Association. What did they do?

Clarkson: Well, I wasn't a founder but an early member. Then, there was a lot of--it wasn't a high-tech--it was like the Electric Steel Foundry in South San Francisco and Pacific Foundry in San Francisco, and the manufacturers that manufactured--some were foundries that provided parts, and our suppliers--

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Swent: So this included some of your own suppliers.

Clarkson: Yes. One or two companies that I remember manufactured food handling equipment, conveying and processing equipment and so forth. There was a lot of that in the Peninsula, in San Jose; there was an iron foundry in Milpitas. {A nonferrous foundry in Palo Alto.} Just about everything that supported industry then, other than electronics. Silicon Valley replaced all of that. Like Bethlehem Steel had a works in South San Francisco, and other steel suppliers. That made up the manufacturers association then. {Joshua Hendy Iron Works was an early day firm on the peninsula.}

Swent: What did you do as an association? What were your activities?

Clarkson: They also provided insurance for us, industrial insurance.

Swent: The association, that is?

Clarkson: Yes. It was through a co-op arrangement. We dropped our state industrial insurance and went to that, which was very, very good for a lot of years. Then the state industrial insurance, they upgraded and got more attractive, and we dropped that and went back to state industrial insurance.

Swent: What insurance was this? For your employees?

Clarkson: Accident, medical, and liability, things like that.

Swent: For your employees?

Clarkson: Yes.

Swent: I see. The association, were they a lobby? Did they represent you in Sacramento?

Clarkson: Yes. It had a lobbying function. Things that they could do better than we could do individually, represent our interest in labor and some of that. And they had an office--the original office for them was in San Mateo. Then they moved it down to Palo Alto in some of the new development along east Bayshore. Of course, there was the elected head of the association and secretary and so forth. We had problems, and the meetings had speakers to talk about problems that would help us or of interest, maybe a political speaker, different ones like that. So it was real good. {Shirley Temple Black was once a speaker. Good one too!}

National Federation of Independent Business

Clarkson: And then the next thing that came along was the small business. It's a national functioning group now lobbying stuff. NFIB. National Federation of Independent Business. That started in the Bay Area, I think, and it became a national organization. Does a better job, in our opinion, than the national Chamber of Commerce for small business.

Swent: Because it's specially geared to your kind of business.

Clarkson: The small business. But we're getting into the upper level of small business because small business takes in all of the small family businesses like restaurants and businesses that can be family-owned and things like that.

The Use of Space in the Company Building

Swent: Let's get back to the building layout. Did you give any thought, for instance, to where your office was? The location of your office in the building. Where was it?

Clarkson: Well, we planned the staff and administrative offices.

Swent: Let's talk about, well, the first one that you had. The old one and then the Bayshore one and then the Reno.

Clarkson: On the plans, it showed Curt's present office as my office.

Swent: This was in the Reno building. He got the corner office upstairs.

Clarkson: Yes. That wasn't even what I wanted. I didn't have any need for a pretentious office, so mine was what--the architect had planned it for me, but we switched [chuckles].

Swent: Where was your office in the building down in Palo Alto?

Clarkson: I had a front corner office there.

Swent: Near the front door?

Clarkson: A couple of offices in between because I had a corner office, and our reception office was in the center. Our accountant had the office on the other front corner, on the north side of the

building, and then mine was on the opposite corner, with the sales manager's office in between. And the engineering office was an inside office with--all of our engineering and purchasing offices were inside, without an outside view. It was all on one ground level. Some had a side window.

Swent: And your shop, then, was behind?

Clarkson: Behind. The lunchroom and the personnel rooms, and then the shop.

Swent: How many lunchrooms did you have?

Clarkson: Just one. We didn't have a separation between smoking and non-smoking and things like that then.

Swent: Was there a separation between staff and workers?

Clarkson: No. It was a small operation then, in those years. Staff and the shop workers and everything, coffee break and lunchtime--it was all together. In the old building, with a smaller crew, we got up to when it was Clarkson and Krebs. Still, staff always met for coffee breaks and lunchtime with the shop people, too. It was always just one group. Of course, when the weather was good, some would have their lunches outside or the staff, if we had a visitor, of course, we would go out for lunch.

I had for several years in that period a lunch membership in the Palo Alto Hills Country Club but it was more of a nuisance; it took too long to make the trip up there for lunch, so we didn't--{impractical--more fun to fly up to the Nut Tree for lunch!}

Miss Grace Brown, Employee Right from the Beginning

Swent: When did you first start having women employees?

Clarkson: Well, we always--right from the beginning.

Swent: You had Miss Brown.

Clarkson: There was Miss Brown, Grace Brown. Because she had lots of mining background, and she could wear several hats. {A key person with Hamilton, Beauchamp & Woodworth Mining/Metallurgical Consultants.}

Swent: Did she actually come down and work in Palo Alto?

Clarkson: Yes.

Swent: She moved from Hamilton, Beauchamp, and Woodworth then, down to--

Clarkson: No. We maintained the office in San Francisco until about 1957, I think. Then I added more mezzanine space in the building, and we acquired this second building.

Swent: This is the one on Bayshore?

Clarkson: No, on Loma Verde and Middlefield. Then we moved all to Palo Alto. But Miss Brown had her home in San Francisco, up beyond the Cow Palace. She bought a car and learned to drive. She had never driven up until that point. And she took to driving just like a duck to water. {Very proud of her new car--a Plymouth.}

Swent: How old was she then?

Clarkson: Well, let's see. She retired when she was seventy-five, and that was about 1975. {Didn't retire because she wanted to! Company policy?} {Grace Brown retired the same year as Art Norman, 1974 or '75. Art was sixty-five and she was seventy-five. --C.C.}

Swent: So she was in her fifties.

Clarkson: She was in her late fifties or early sixties.

Swent: Did you have any other women employees?

Clarkson: Yes, well, Miss Brown trained our first, took her under her wing--our accountant. When we separated, I hired a new accountant, a young lady, Norma Cox was her name then. She had the basics, and then Miss Brown trained her because Miss Brown's office was right next to us in Krebs' new building. Of course, Miss Brown remained--I kept her on, separately, as an officer of the Clarkson Company. She was always very much interested, helpful, and loyal.

Girls in the Office

Clarkson: Then we had a receptionist and a secretary, but no women employees in the shop work. It was all in the office. {Also our accountant.}

Swent: When you moved to the Bayshore building, was this essentially the same?

Clarkson: Same setup. We had a receptionist and a secretary there. Our staff secretary, we had printing equipment and she printed the literature, and when we got the fax machines--so a lot of that in-house. The office activities were by the girls.

The Bayshore Building: Bigger and More Parking Space

Swent: How did the Bayshore building--how was it different from the Loma Verde buildings?

Clarkson: Just more space, {all in one building}, and parking space.

Swent: More shop space, more storage.

Clarkson: At the Loma Verde buildings, when those were built as industrial buildings, no parking space was required. We had the truck alleyway for the trucks to come in, pick up and unload and so forth, and just a circular driveway in front that could accommodate a couple of vehicles for visiting people. I always tried to keep that clear for visitors. Parked my pickup in the back and if it got in the way, it got moved around. But it was all street parking.

And then the last probably three or four years, they built a church across the street from us, and the church didn't have any cars during the week, so we were able to make use of their lot until we moved to Bayshore. Then the parking requirement was a city requirement for the number of employees that we had.

Swent: How many employees did you have when you first moved to Bayshore?

Clarkson: I don't remember. Something like twenty-five.

Swent: I see. How many people were actually working in your shop, making your equipment? Approximately.

Clarkson: Twelve to fifteen.

Swent: And these were all men.

Clarkson: Yes.

Swent: You worked just one shift a day?

Clarkson: Yes, we did. But then, as I mentioned about Hewlett Packard, employees lived right in the area, machinists, one or two machinists that moonlighted. If we needed to do something extra, they could work at night.

Swent: But they were just on call.

Clarkson: They were on call. Always arranged their hours ahead for a week, like that. They were within walking distance, so some of us--like, I would work, too, at night. Go down and be there when we had one or two fellows working in the shop. And then our janitor, a Japanese fellow. He was our janitor and our gardener. He always worked at night. He would be there lots of times, cleaning offices and the shop floor, too--after hours.

Tadashi Abe, Well-Educated Gardener and Security Guard

Swent: Did you have any security guards or security people?

Clarkson: Yes, our janitor.

Swent: He was your security officer as well [chuckles]?

Clarkson: He lived just down the street on Loma Verde from the works. You've seen the mine car.

Swent: Yes.

Clarkson: One night he caught a couple of fellows trying to steal the mine car.

Swent: Oh, no!

Clarkson: They dumped the rock load out of it, and he heard that, and they had gotten it off the track, and they were in the process of getting it out on the sidewalk. He caught them at that. But they got away before the police got there.

Swent: You had that out by your entrance, the same as you do here?

Clarkson: It wasn't fastened down there. After that happened, why, then I fastened it down with some anchors and chain underneath. But he worked for us all the years that we were there.

Swent: What was his name?

Clarkson: Mr. Tadashi Abe, {pronounced "Obby," and always called Mr. Abe}. He was actually, when he came to this country, first migrated to Brazil, South America, and then from South America to this country. He attended college, got a college education, a chemical engineering degree from MIT.

Swent: For heaven's sake!

Clarkson: And then, during the war, he farmed in Colorado. He was never in an intern camp. And then to Palo Alto. He was quite an intellectual person, too, but he liked his gardening. A very delightful fellow. And of course pretty well educated for a gardener, but that's what he liked to do. We still keep in touch with his widow. But he died just after we moved here, had a heart attack. We miss him.

Unique Protection from the Unions Through a Shop Steward Neighbor

Swent: What about unions? Was there ever an attempt to unionize your plant?

Clarkson: Yes, one attempt, but we had union protection. That was kind of unique. Our neighbor on Loma Verde was Dura-Bond Bearings.

Swent: What?

Clarkson: Dura-Bond. That was their trade name. The business was remaking engine bearings, automobile engines. Rod bearings and main bearings for automobile engines. They went to firms that rebuilt automobile engines for replacement. That was a pretty good business then. They were unionized, but the union steward there was also the shop foreman. They didn't have the kind of machine tools that we had, and I often let him come over and do a machine job on some of our machines. We got one employee that tried to promote unionization, but we kept that down. {Our little crew had no use for union activity.}

But the union steward--the Peninsula area chapter of the machinists union--got to be a good friend [chuckles]! One day, three fellows came in and announced that they were from San Francisco and they wanted to go into our shop and talk to our crew. I denied them that privilege.

Swent: Were you allowed to do that?

Clarkson: Yes. Then. I got away with it, at least. I told them--I invited them out. I sent them off. As soon as I had the opportunity, I told my friend over at Dura-Bond Bearings. He was the machinists union steward there. I told him about these fellows coming in and trying to strong-arm me, demanding that they talk to our fellows in the shop, and he immediately said--I had their card and so forth, which I gave to him. {They gave their card to our receptionist and just walked on in.} He said they had no business being there. He said that was not their--it was out of their territory, that any unionization talk, they had--their chapter there had the privilege of doing it. And so he handled it, and we had no more visits like that at all.

Swent: And he was your neighbor.

Clarkson: And he was our business neighbor. Dura-Bond Bearings. They eventually moved from there to Oakland. The founder. He was the owner. He passed away and then it went into other hands. I don't think it remained as a family business, but it still exists. Since we moved here, they moved from Oakland to Carson City. Curt has met some of the fellows there. But the fellow who was the founder of it, Jack Fowle, had been chief engineer of the Joshua Hendy [Iron] Works in Mountain View, I guess. Westinghouse eventually acquired that plant site.

The mine car that we have over there is a Joshua Hendy. During the heyday of the Mother Lode, Joshua Hendy was one of the early--they built--it was a Pioneer foundry. They built stamp mills and mine cars and all of the mining equipment of that kind, in their heyday. {Steam engines too, I think.}

Swent: So you never had any more approaches from the union.

Clarkson: No bother. One fellow that we had tried to talk union. We eventually had reason to get rid of him. So all through those years, the only other union problem we've had was with mining companies that were on strike. They had to cancel orders or delay shipping of orders, and some of our vendors, like the Boston company that supplied bearings and gears for our feeder requirements, they had some long strikes and we couldn't get the parts like that that were needed, and sometimes that kind

of put us in a bind because we couldn't deliver our orders on time. So that was about the only kind of union problems that we ever had. {Old axiom--for the want of a nail the shoe was lost, for the want of a shoe the horse was lost, and for the want of a horse the battle was lost.}

Swent: That would be the only union that would apply to you, the machinists union?

Clarkson: At that time it would have been the only one. In later years, the rubber workers and some of the fabricators; it would be more an effect on our incoming parts, rather than our own employees. {I always strived to make a better work place than unionization would sustain. In this same period our rubber supplier, Holz Rubber Co. (Bill Holz), fought off and won over an attempt by a rubber workers union to shut him down or else--the "else" was that they set fire to one of his buildings. Bill was tough and prevailed! No union.}

Certified Vendors and MRP

Swent: Speaking of vendors, you used a term earlier, of "certified vendor." What is a certified vendor?

Clarkson: Well, that came later when we went into the MRP system of computerization. Materials requirement planning. For a small company, we were one of the early ones to adopt that system. Then a certified vendor. They agree to supply on our call, our need, and also they do the quality control. The parts, like foundry casting. They're inspected for quality. If they're certified, they guarantee the quality before it comes to us. We used to have experiences we would get a delivery of castings that some were defective or not just the right size. Then we would have to reject them. Then the foundry would have to supply us a new batch. And certified assured us that the parts when they arrived, they didn't have to go through quality control inspection; they go right into the machine shop and on into the production pipeline. That was a part of inventory control.

"Always Squeezing Out Spaces for Growth"

Swent: Let's get back now to the buildings. When you moved then and had your building constructed up here in Reno, was this the first time you had a two-story office building?

Clarkson: Well, not really. The original tilt-up building that we had in Palo Alto fortunately had a high enough ceiling. It didn't first have any mezzanine structure, and so for office space and even some of the shop space, by designing a real thin floor structure, all steel, we retained enough headroom to have upstairs offices, so I moved my office upstairs, and then the office for Kelly, an upstairs office, and a drafting room.

##

Swent: So you actually had an upstairs office before.

Clarkson: Yes.

Swent: And then you went downstairs.

Clarkson: There was room to do it, and that's how we took care of growth until we got too crowded and all that, and then we started planning for the Bayshore facility. That was supposed to last for ten years, but it got overcrowded before ten years. We were doing so well. But we gained space when we separated because I first got the main building and Krebs built a new building; they got the lot right alongside of us. I think I told you this before, that we did all of the machine work for Krebs until they got a shop of their own. Then, when we cut that off, we had more space again.

Swent: When you moved to the Bayshore facility, then, that's the one where you said you had your office--you had a front door, and then at one end was your accountant's office and at the other end was your office.

Clarkson: Yes. In the front. But also there were three offices.

Swent: When Curt came in, did he have an office?

Clarkson: Well, he had the engineering office.

Swent: And that was the interior.

Clarkson: Yes. That was a good-sized room, but then just across the hallway from my office, also adjoining the engineering, was the

other engineering office, the drafting office, and all of that. And in that office we had three or four fellows in there.

Swent: Where was Omer's office?

Clarkson: Inside, from the secretary's office. And we had the purchasing agent's office and then Omer's office in that area. And there we had a mezzanine built in, but it had only been a storage area, so then kind of like we've done over here, why, the mezzanine had to become office space. It was closed in. The mezzanine, you could look down on what was going on in the shop. We just had storage. The mezzanine was over the lunchroom. We always kept squeezing out little spaces here and there for growth.

Then the same thing happened on Bayshore. We kept squeezing out a little more space here and there [chuckles], moving machines around. But then, too, inventory took up a lot of space in that building.

Swent: Who had done the kinds of things that Omer did before he came on?

Clarkson: Mostly the secretary and the accountant. It was a function of the accounting office, to get the reports in, financial reports, do the insurance, keeping checks and paying for the insurance and taxes. That all fell on the accountant and her secretarial help, too.

Swent: And Curt took over a lot of what you had been doing.

Clarkson: Yes. We say that engineers don't usually like to do personnel [chuckles] work. That was some of my good experience with Bradley Mining Company because we were a first-time company, mining company that I knew about that put on the staff a personnel manager, and that took a lot of load off the other staff members.

First, Direct Marketing

Swent: You have talked about that. It's interesting. So as your company grew, were there sort of milestones as it grew? I'm trying to get a sense of how your company grew.

Clarkson: Well, first, with Krebs up through that period--

Swent: No, I mean Clarkson.

Clarkson: I'm putting the foundation on. We didn't have any sales reps. Everything was marketed direct to mining companies, engineering companies like Bechtel and WKE and Wemco. Our orders mostly came direct. And then after we separated, we set up the first sales rep organization. The first sales manager that I hired, that was one of his first jobs, to change our marketing method. So then we went on from that, different staff specialization on sales. But we continued with getting direct sales, too, which we didn't pay a rep commission, like direct sale to Kennecott, Asarco or any of those. We didn't pay any rep commission until we established territories for them. That provided them and our pricing, which changed that. We had to make an allowance in our pricing to pay our reps' commission. That was for foreign areas, too. We were still doing a lot of foreign marketing, especially on feeders, direct to the user. That required more staff.

Norma Cox and the First Computer

Clarkson: Then our first computer was a computer terminal. Norma Cox, the accountant, when she needed to put into the computer, she had to call the terminal and do it--put the feed into the computer on the telephone [chuckles].

Swent: Do you remember when that was?

Clarkson: Oh, I think that came along in the late sixties.

Swent: Where did the impetus for that come? Was she the one who pushed for it? Or did you?

Clarkson: Being in Silicon Valley, that was one of the first--for a small business, that was the first computer, to rent a terminal or lease a terminal, whichever it was. Then records starting accumulating there and had to be recorded.

Swent: This is first just for your financial records.

Clarkson: Yes. And I think tax records and all that sort of thing. And then in that period microfilming came along. We had a neighbor on Loma Verde that was in the microfilm recording business, so we started recording drawings and our records that needed to be protected from fire or other disasters. They were microfilmed and put into the microfilm vault.

Storing Microfilmed Records in Former Railroad Tunnels

Swent: Did you have a vault there at your plant?

Clarkson: No, that was a firm, too. Some of the tunnels for the rail line that ran between Cupertino and to the coast side over to Santa Cruz. The tunnels through the range ran through sandstone, and when the rail line was abandoned, why, the microfilm company acquired those tunnels to store--and they converted them into vaults or a vault area to store microfilm. That was a service that we availed ourselves of, and paid for the storage of microfilm.

Swent: I had never heard that. And you learned about this because of your neighbor?

Clarkson: No, our neighbor--that was a business that located there. Then, of course, we knew the business that they were in. We had it explained to us and all of that, so we started participating.

Swent: Does that still go on?

Clarkson: Microfilming is still done. I don't know the extent of how the outside storage of critical records is done.

Swent: Do you still do that?

Clarkson: We still record our drawings and things for safe storage, away from the plant site.

Swent: Still down in those tunnels?

Clarkson: No, I don't think so. I think that went through a change with the growth of Silicon Valley and that type of services. But we got a lot of the little company--a lot of pioneer updating of methods and all of that. My old head [chuckles] won't take on all of that anymore.

The Advantage of Being "In the Shadow of Stanford"

Swent: You must have been early in the computerization of your plant.

Clarkson: Well, I always say that our first twenty years there was just great for us because we were, along with Stanford, what we

participated in and so forth--a lot of it rubbed off on us. If we had been in business here, for example, or continued in Boise, places like that, we wouldn't have had that kind of exposure. But being in Palo Alto in the shadow of Stanford, why, and all that was going--the Stanford Industrial Park and the engineering firms that were then established in San Francisco, why, back door--Kaiser and WKE as well as mining companies, was the activity of the San Francisco section of the AIME. We were just in the best possible location for a little growing outfit coming along, to be educated in all of those activities.

The Palo Alto Chamber of Commerce and Anti-Business Sentiment

Clarkson: I served a few years on the Palo Alto Chamber of Commerce and other activities, community activities like that, and it helped us. There was lots of controversy in the Palo Alto Chamber of Commerce, to the point that the chamber was--so much in Palo Alto was anti-business, like ours, that the chamber quit taking any tax money, anything from the city. It became an independent organization, totally supported by the members of the Chamber of Commerce, rather than any tax money being put into it, like what's common practice. There was lots of controversy between the Chamber of Commerce and the city council.

And some with Stanford even, too, because the development of the Stanford Industrial Park had quite an impact on downtown Palo Alto. And then the Stanford Shopping Center. When they figured out how to use Stanford land by long-term leases, because the land could not be sold, that really made a big change in downtown Palo Alto. The Chamber of Commerce then more represented downtown Palo Alto and the industrial areas, like where we had our first building, that was zoned as an industrial, light industrial area. And so the Chamber of Commerce tried to protect us and our rights there, and the other element in the city council, they didn't like our kind of industry. They wanted residential or high-tech stuff. And so it became a pretty controversial area.

But in those years a great place for us to be. I'm really appreciative of that fact. And commuting into San Francisco, our office up there, we didn't drive up there. We most always commuted on the train. The Krebs lived in Palo Alto. Kelly--his office was in the San Francisco office, where Hamilton,



PALO ALTO
CHAMBER OF COMMERCE

*In Appreciation of
Dedicated Leadership and Service
to the Community by
J. Robert Clarkson*

DIRECTOR
1975-1978

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Beauchamp, & Woodworth, when they started retiring. We talked about that earlier.

Swent: Yes. So you moved, then, to Reno in 1986.

Clarkson: We were supposed to get here in 1985, but the inclement weather slowed down the construction, unfortunately, so we didn't get moved till '86. Actually, Edna and I moved into this house in December of 1985.

Company Newsletters: *The Valve Grinder* and *The Clarkson Globe*

Swent: When did you begin your newsletter, this wonderful letter that you put out? Was that already going in Palo Alto?

Clarkson: No, oh, no, it wasn't. That was started here. The first title for it was *The Valve Grinder*.

Swent: *The Valve Grinder*?

Clarkson: Yes. They put it out for suggestion. That was suggested then. Then it was shelved for a while. We didn't have enough interest in it to keep it going. And then it came back as *The Clarkson Globe*, with some different planning for it and fresh interest.

Swent: Whose responsibility is that?

Clarkson: Some of the employees.

Swent: You think of it more as an employee newsletter?

Clarkson: Yes, it is.

Swent: But you also use it for sales, too.

Clarkson: Some. For general information, events, occurring events and things like that. They try to get a story about an employee, how they started with the Clarkson Company, like one in the last one. Curt wrote the one for Omer.

Swent: Who puts it out? Whose department is it in?

Clarkson: It's in the--one of the girls {Carol Beeson} in the sales department that heads it up. They invite items to put in it from any of the employees that want to put something in. And



Faces at Clarkson

Here at the Clarkson Company there are a lot of people we see day to day but really don't know much about them. This gentleman, in particular, started working at Clarkson Co. about 13 years ago. He brought with him 23 years of experience as a Chief Financial Officer / Chief Operating Officer. He has played a big part in helping grow the company into what it is today. We don't have very many CFO/COO's running around here, so you probably guessed we are talking about Roger McMillin, our V.P. of Finance and Operations. Roger was born in Sidney, Ohio and graduated from High School there. He has served in the ARMY, earned a Masters degree from Central Michigan College, and met his wife of 43 years that can keep up with him stride for stride. Roger and Norma have 2 - boys, 2 - girls, and 4 - grandkids. Roger has had some interesting jobs. His first job was working for a contractor in Sidney where he did design and estimating work. Roger was the Controller for Mike Sells, a snack food manufacturer. He left and later returned to work for them as CFO/COO, they couldn't get enough of him. Roger also worked for Laserplane as CFO/COO, this manufacturing company made laser guided manufacturing equipment. Roger told me he enjoys working because of the people that he works with. He likes sharing what he knows, and working in the team environment here at Clarkson. Roger's hobbies include woodworking and operating gigantic heavy machinery. It's good to know you Roger.



SAVE THE CANS !!!!!!!

Yes even cans have become scarce and worth saving. Here at the Clarkson Company we have bins to collect aluminum cans in both break rooms. Even cans you bring in from home can make a difference. These cans support very worth-while causes. They are donated to the Sparks Greenbrae Lions Club and in turn support many programs that help people, such as, camps for children and eye-sight programs to help needy people get glasses. There are hundreds of other worthy programs that the Lions Club Supports. So please make an effort and put those empty soda cans to good use.

Update on the ERP System

Since the last issue of The Globe, the ERP committee and others have completed all core module training, then got busy and developed scenarios for piloting. Rick and Brian have completed the initial data conversions, set up all system flags and tables for the pilot run and are working on fine tuning the data conversion steps for the live conversion.

The pilot process will last until the end of September, with user training to start in early October, until we go live. The last week before going live will be when the cut-over will begin, as we start entering data into InfoFlo for our November 1st go live date.

While there is still a lot of work to be done, the ERP committee has been working very diligently to get this pilot process going and see that we meet our deadline.



JUVENILE DIABETES FOUNDATION WALK TO CURE DIABETES



Who Has Diabetes? Approximately 16 million Americans (100,000 of them in the state of Nevada) suffer from diabetes. Heart disease, stroke, kidney disease, blindness, loss of limbs and nerve damage are just some of the complications that are associated with diabetes. Over 200,000 people will die from this deadly disease and its complications this year alone.

Who Can Help? You can! So can your friends, family members and co-workers. By participating in this year's annual **Walk to Cure Diabetes**, you can help us raise funds that will go directly towards vital research to find the cure for diabetes. The following people have already signed up to walk: Curt Clarkson, Omer and Claudia King, Roger McMillin, Hank and Ann Frohlich, Dawn Frohlich, Hayley Fritz, Amy Taylor, Devan Taylor, Brian and Laura Kagele, Denise Sims, Anjanette Sabin, Stephen Sabin, Frank and Patty Pia, Denise Hudson, Matt Delongchamps, Denise Ulving, Carolyn Henry, Leonard Smith, Yvette Hickey, Doug and Teri Merryman, and Bill Sharkey. If you would also like to come out you can get the forms and sign up in the Reception area.

When? The walk will be at the University of Nevada on October 11th. The Clarkson Company's goal this year is to raise \$10,000. The Juvenile Diabetes Foundation hopes to raise \$150,000 from this year's walk. After the walk there will be a picnic in the Quad. Lunch will be from Port of Subs. Nevada Bell will be giving tethered rides in their hot air balloon. Bertha and Angel will be there from the Nugget. There will be face-painting, clowns, and the UNR Wolf. So bring the kids out, walk, raise money for a good cause and most of all have fun.



Dawn on the Amazon

As the rising sun begins to paint the puffy clouds with a spectrum of pastels, a weary Clarkson regional manager blinks his bloodshot eyes and is carried across the southern mount of the Amazon to another exciting and expanding adventure into the wilds of the Brazilian jungles. Seemingly unaware of the voracious piranha swirling beneath the barge... If this sounds like the beginning of an Indiana Jones novel, just imagine what a real salesman is confronted with to get to the mine sites of the world.

WHAT'S NEW AT CLARKSON

New Loading Dock Some of you have probably noticed there's been a lot of earth moving equipment, cement mixers and other types of industrial traffic through the parking lot lately. Well if you've been wondering what's happening, they are all part of a crew hired to build our new loading dock. Construction started in April and the completion date should be some time in late September to early October, if nothing else changes (I've heard it referred to as "The Winchester Mystery Dock"). This new dock is just the beginning of a plan that will change the way the back lot looks. So, expect to see more equipment and a lot of changes in the distant future.

Purpose of the Dock The main reason for the dock is material handling, primarily the crates full of smaller ductile and stainless valve bodies and pallets full of larger valve bodies. Our current method of unloading these castings is quite complex and very time consuming. The crates or pallets are unloaded from the truck parked at the dock at the front of the building and hauled out to the front parking lot. After all the crates are unloaded off the truck (sometimes as many as 20 crates) they are hauled to the back lot where they are stored on shelves until they are consumed by the machine shop. So you can see the time it takes, plus the wear and tear on the forklifts and the shipping and receiving staff. With the new dock in place the trucks will be unloaded just a few feet from where the casting are stored and in many cases the crates or pallets can be taken from the truck to the shelf in one motion. The new dock will also help ease the loading and unloading of more complex freight entering and leaving The Clarkson Co. such as the large crates of the 42" KGA valves or new machine tools and/or equipment.

Take a Look If you can find the time, walk outside and take a look. You'll notice some of the safety features like the automatic trailer chalking device, guard rails, lights, (so now the swing shift crew will be able to see what they are doing). I hear there will be an arm that swings into place at the dock opening to keep people from walking or driving off the dock when there is no trailer loading or unloading. Also while looking at this new dock most of us can appreciate that we didn't have to work in the 100 degree temperatures to make this project possible.

In April, John Stebbins traveled to Belem, in the state of Para, Brazil, with Marcos Mello of Krebs, Brasil, to visit the Alunorte alumina plant. The plant is situated across the southern mouth of the Amazon river from Belem. Many barges, with tugs to push them, have been converted to car and truck ferrys to carry the traffic about two kilometers (1.2 miles) across the river to connect to the road that goes to Alunorte. About an hour's drive onto the delta island (50 km or 31 miles), Alunorte is located next to a smelter that converts the smelter grade aluminum (SGA) into aluminum ingots or wire bar. The product is loaded on barges for transfer to ships that transport the aluminum around the world. Alunorte produces about 1.4 million metric tons per year of SGA, ranking amongst the world's largest plants.

The aluminum business is growing as the world demand grows. The industrialization and population growth of the lesser developed nations of the world, has fueled the demand for products that require aluminum. With aluminum being one of the more widespread elements in the earth's crust, the companies that are able to process the bauxite ore into aluminum most efficiently, are the one's leading the marketplace. The alumina process has traditionally been labor intensive to operate the equipment to dissolve the aluminum out of the bauxite. Automating the process brought Clarkson into the picture into many plants around the world. The use of the KGA has allowed the replacement of expensive (and hard to maintain) manual valves with an automated valve that can be operated reliably from a control room. The visit to Alunorte, and other alumina plants in Brazil, opens another industry to Clarkson valves in South America.

Clarkson After School Program Begins

The Clarkson after school program begins on September 28. If you have a child in kindergarden thru 6th grade you are eligible to participate. The program takes place on Monday and Tuesday afternoons from 3:15 to 5:30. The class is taught by Mr. Steve Howe, who is a 6th grade teacher at Donner Springs Elementary School. Parents will assist the teacher and provide snacks. This is the third year for the program and we hope for another successful year. If you would like to know more about the program contact Carol Benson or come by and sit in on a class.

Have Something to Say?

Maybe a story, cartoon, recipe, comic strip or even something to sell. Feel free to submit it to Dawn, Carol, Brian, Leonard or Mike S. and you may be published in our next issue.

BIRTHDAYS

AUGUST

08/10 Randy Kirkpatrick
08/12 Paul Finch
08/16 Valene Jochimsen
08/17 Leonard Smith
08/19 Mario Martinez
08/23 Carol Beeson
08/25 Robert Mills
08/25 John Moser
08/29 Bradley Henderson



OCTOBER

10/02 Koh Mural
10/14 Dennis Ogden
10/15 Amy Taylor (30)
10/31 Doug Felker

ANNIVERSARIES

1 YEAR

Marisa Bear
Ricklin Smith

5 YEAR

Dave George
Gary Boyer

SEPTEMBER

09/01 John Stebbins
09/02 Frank Pia
09/06 Christopher Scott
09/07 Denise Sims
09/09 Steve Thomas
09/15 Gary Boyer
09/17 Doug Scheidt
09/19 Jeff Callahan
09/20 Edmund Brown
09/30 Bill Sharkey

10 YEAR

John Sharkey
Terry Heckler

Congratulations to

Doug & Annette Felker on the birth of 6 lb 9 oz. Jeremylee born on July 9
Adam & Robin Hensley on the birth of 8 lb 1 oz. Ella Jean born on August 17



The Clarkson Globe

Volume 13

April 1999

Hank Frohlich:-- played soccer
... likes girls, cars and
drive-in shows ... dislikes
cars that out-drag his ...
favorite pastime is driving
'49 Olds.



It all happened in the City of Cali, Columbia, on April 6, 1938. So, you ask - what happened? The birth of Hank Charles Frohlich, destined to be a super guy and super S, M & E Vice President for The Clarkson Company.

Cali was Hank's home for 14 years and when he moved with his parents to San Francisco in 1952, he spoke German and Spanish, but no English. The thing that is remarkable is that he graduated with his all English speaking class at San Francisco's Lincoln High School in 1956. That was also the year of the only football game between Palo Alto and Lincoln, Palo Alto won. I don't think Hank cared.

From there Hank continued his education at the University of San Francisco, College of San Mateo and U.C. Berkeley. His major interest was aviation and he served in the Air Force Reserve from 1955-1962 piloting a C119 Flying Boxcar. His most notable memory was landing in the snow short of the runway at Nome, Alaska. He and the crew walked away, in fact, he can do more damage to himself in his bathroom at home.

When college got to be a drag, Hank joined Dymo Industries and that is where he met Ann, the gal he calls "Poo". Well, this is when the road to Clarkson really started. Hank and Ann, now married, moved to Mexico City for three months and then on to Puerto Rico where they lived for five years, staying one final year with Dymo and then joining Gillette as Regional Manager for the Caribbean. The next stop was Miami and five years as Latin American Sales Manager for Levi Strauss. When the Levis got too tight, Hank moved on to Colt Industries still covering Latin America, but now getting into industrial sales and learning more about pumps and valves. Can you see how he is getting closer to Clarkson?

Colt kept Hank in Miami for another five years then moved him to Rochester, New York, and finally on to Reno. It was not all that simple, though, because along the way, Kurt and Debbie were born. Hank also served as a volunteer fireman and he traveled a lot.

Hank came to Reno as the Western Regional Manager for Colt's Fairbanks Morse Division. It wasn't too long until they closed the Western Region office here and Hank said enough is enough, we are staying here. Hank got a job helping his son Kurt start Wings-n-Things, but the pay was well below minimum wage so Hank kept looking. Clarkson was also looking, so when the line of sight met and Hank successfully attended an APICS dinner and finally was approved by Edna Clarkson, he came to work.

You know the rest - four wonderful grandchildren, ballooning, fishing, rock hunting, teasing and all that, so I'll bring this to a close by saying thanks Hank for 12 great years at Clarkson and that should be just a new beginning.

Something Fishy is Going On at The Clarkson Company

THE ONE THAT GOT AWAY The morning of January 3rd started out as being one of those days when Mike Sharkey knew nothing was going to go his way.

We were already running late, it was very cold and I couldn't get my boat trailer hitch over the ball that it had fit over who knows how many times in the past. Finally, after jumping up and down on the tongue of the trailer it went on. So off we go to Pyramid Lake, myself, my brother John and our friend Johnny Tripp.

We get to the lake and launch the boat, the battery is dead. Lucky for us Johnny had brought along a portable battery booster. We get the boat started and off we go for a day of fun. We started north from the boat ramp and trolled for a mile or two fighting small winds, big waves and no fish. Two or three hours go by and we have not caught anything. So, we decide to try another part of the lake. (I can't tell you where though, I'm sworn to secrecy). By this time it's about 1:00 o'clock in the afternoon and we had only caught one little fish. All of a sudden, John gets this big hit, he sets the hook and the fight is on. He plays this fish for about 30 minutes. Finally he gets the fish up to the boat and we can see that it's about 32 to 34 inches long. Johnny gets the net ready and John gets the fish close enough to net. Just then the fish gets free from the lure. Johnny tries to scoop it up with the net but the fish is too long to fit into the opening of the net and Johnny sends it cart-wheeling into the air and back into the lake.

You should have seen the look on John's face as he watched the biggest fish he had ever caught, get away.

But that's not the end of the story, we ended up catching a total of thirteen fish that day and John and Johnny were not disappointed. John caught a 27-1/2" 7-3/4 lb. Trout and Johnny caught a 24-3/4" 5-1/2 lb. Trout. So it turned out to be a pretty good day after all.

MEGA BYTES FOR A COMPUTER WIZ On Saturday, February, 27th Louis Lawson went to Pyramid Lake to partake in a fishing tournament that he and his father-in-law had signed up for some time ago. They arrived at the lake before the sun came up. They launched their boat and headed north. They hadn't even been on the water for an hour and had caught their limit. But they continued to fish, trading bigger fish for smaller one's in the live well to keep at their limit.

Louis had caught a nice 25" 6-3/4 lb. fish by about 7:00 am but not knowing what the biggest fish was going to be in the tournament they continued to fish in search of bigger and better. They fished up until about 3:30 pm when it came time to weigh in. Most of the contestants had already weighed their fish by the time Louis and his father-in-law got there. They weighed all their fish and ended up in 1st place as a team with a total weight of 12 lbs. Soz. But there were still two more contestants that had not weighed in yet, so there was a few tense moments before it was confirmed that they were the winners.

For first place the winners split a cash prize of \$350.00 plus they each won two years worth of free fishing permits at Pyramid Lake. Not only did Louis win the tournament but he also made a side bet of \$5.00 with some of the other contestants and won \$210.00 for the biggest fish.

In closing I should let you know that Louis and his father-in-law ended up catching a total of 16 fish in which all but 2 were in the keeper range. GREAT JOB LOUIS!! Do you think he owns any fishing software??

SOME SIDE NOTES If you're interested in hearing any other fishing stories, you might talk to Jeff Bernardi, Jim Flath and George LaCombe. They all have some pretty good stories that I'm sure they wouldn't mind bragging about.



"Of Things Both Large and Small"



Everybody in Costa Rica goes bananas - correction! GROWS bananas. Well, this story may sound like funny monkey business, but, none-the-less, it's true. During Bill Saravanja's tenure as an engineer with Chiquita Banana in Costa Rica in the 1970's, he encountered a strange phenomena. On one of Chiquita's 12,000 acre banana plantations in Palmar Sur, Costa Rica's Pacific coast, excavating machines cutting drainage canals unearthed several round balls of solid stone varying from six inches in diameter up to seven feet in diameter. The plantation was on land having a seven foot thick rich loam soil on a flat flood plain near the Terraba River, a few miles from the sea coast and about 25 feet above sea level, with no other rock mountains in the area. Prior to the plantation the land was virgin jungle inhabited by Indians.

These round stone balls have been dug up a few at a time as far back as the 1940's as a dragline would occasionally pull up a ball or two. In the 1970's during a massive drainage program, dozens of stone balls were unearthed and shipped all over Costa Rica as ornamental landscape pieces. They captured popular recognition by explorers of world strange phenomena and by Archaeologist Doris Stone, who, with the assistance of specialists and measuring instruments, found balls as large as six feet in diameter to be within one-sixteenth of an inch in a perfect sphere as depicted in her book "Archeology of Costa Rica."

Since the stone balls were found as close as a few hundred yards and as far as several kilometers from one another, Bill had the Chiquita engineering surveyors locate and map out their locations which showed perfect triangles and intersecting lines that aligned with astronomical East and West. One such find revealed 120 balls starting from six inches progressively up to six feet in diameter laying in a quarter moon pattern about 400 meters in diameter. How did these balls get there? One theory is that this land was below sea level, and a nearby volcanic eruption shot molten sand stone into the air which formed into round balls as it hit the cool ocean water, such as in the method for making bee-bee's. Nobody can explain the unique geometric positions. Add to the fact that Palmar Sur was also a place for occasional UFO sightings it was enough to make everyone wonder why they acted a little strangely once in a while.

Dear Clarkson Friends,

Thank you so much for your prayers, sympathy and cards in the death of our Father, Grandfather and Great-Grandfather, Omer King Sr. By any standard his life was long and full. He lived it with love, commitment, friendship and hard work. The word gentleman comes to mind when thinking of him because he was truly a gentle man. We will miss him.

The King Family

Have Something to Say?

Maybe a story, cartoon, recipe, comic strip or even something to sell. Feel free to submit it to Dawn, Carol, Brian, Leonard or Mike S. and you may be published in our next issue.

BIRTHDAYS

FEBRUARY

02/02 Curt Clarkson
02/02 Tom Copling
02/02 Rick Smith
02/06 Yvette Hickey
02/10 Ted Stoltung
02/12 Dave Machen
02/12 Eric Whitney
02/12 Jack Strother
02/19 Craig Eaton
02/25 Joanne Dickson

MARCH

03/02 Casey Elmer
03/03 Brian Ramorum
03/05 John Blackburn
03/19 Jay Miller
03/21 Elvis Herrera
03/26 Nick Williams
03/29 Carolyn Henry

Congratulations to
Louis & Jeannie Lawson
who are expecting a daughter
on July 9

APRIL

04/01 Larry Koll
04/02 Jim Ditch
04/02 Kim Lelander
04/06 Hank Frohlich
04/06 Doug Merryman
04/09 Brian Kagele
04/13 Jamie Carpenter
04/16 Scott Smith
04/25 Mike Sharkey
04/28 Andy Golden
04/28 Denise Hudson
04/30 Anjanette Sabin

ANNIVERSARIES

1 YEAR

Brad Henderson
Craig Eaton
Norberto Flores
Martin Mendez
James Shoshone
Mario Martinez

5 YEAR

Tom Skeet
Dave Machen
Ted Stoltung

10 YEAR

Carolyn Heury
Mike Sharkey
Jamie Carpenter



then to get a feature, an employee, their background, their history. So it is serving pretty well now.

Swent: You think of it more for employee relations, then.

Clarkson: Develop more employee interest--{a current copy goes in with each employee's paycheck.}

Hank Frohlich, V.P. Director of Marketing

Swent: When did you hire Hank Frohlich?

Clarkson: Well, after we moved over here. He was regional manager here for Fairbanks Morse a Colt Industries Company. I have to jog my memory. Also the Garlock Company. Garlock seals. Garlock manufactured lots of asbestos, like brake bands and pump seals. Hank had lots of South American experience with Garlock--a division of Colt Industries. I don't remember just how we heard about Hank, but the second marketing manager that we had moved over here with us.

He was a very capable young fellow but also considerable dissatisfaction with him. Curt was dissatisfied with him, and so Curt and I commiserated together just how to handle this Dick Burmeister situation. His family didn't want to move over here, so I think mainly we used that fact to make a change. And Hank came onto the scene and had the first interview here at our house with Edna. Edna says that she's the one that hired Hank [chuckles]. So that's the way it started.

But this young fellow that was our second marketing manager, his father was a long-time friend of mine and had been our sales rep in the northern California territory. His father had passed away during that period of time, but we had to make the change, and Hank just came along right at the perfect time for that. He filled our requirements so perfectly.

I might have mentioned, too, our first marketing manager, Lee [Leland] Aplin, retired. He was a "Norsky," a Norwegian. He came from North Dakota. His wife came from Butte, Montana, so he had never been involved in mining. But his long-time experience was he was in instruments. He had a degree in instrumentation.

He was sometimes controversial, but he did a lot of excellent work for us. His background of instrumentation was a

real good asset for us, and he did a good job over the years. But there again, he was having eyesight problems, and he was up to sixty-five years old, so when we moved it was a good time for him to retire. And then we had already hired Dick Burmeister. He and Lee didn't get along very well together and some things like that, so the change was very timely and very good for us with Hank. His Latin American experience and--

Swent: He was born in Colombia, I think, wasn't he?

Clarkson: Yes. And Spanish speaking, all Spanish up until age fourteen. He went to school in San Francisco. {Fluent in Spanish and German.}¹

Swent: And, of course, now you're doing more and more business in Latin America, aren't you?

Clarkson: Yes.

Swent: So when you moved over here--

Clarkson: Oh, Hank was already established here, but his company {Fairbanks Morse Engine Division of Colt Industries & Garlock} was moving him back to New York. They had already lived in New York, and he was very much wanting to stay here, for his family's sake and everything, so we came along at the right time for Hank, too. So it's interesting.

Good Luck, Opportunity, and Gratitude

Swent: A happy solution for everybody.

Clarkson: Those things that happen for the good that you never plan in advance.

Swent: He seems to have fitted in to the spirit of the place, beautifully.

¹{Hank Frohlich: Education: City College of San Francisco, San Francisco, California; San Mateo College, San Mateo, California; University of California, Berkeley, California; University of Puerto Rico, San Juan, Puerto Rico.}

Clarkson: There's been a lot of that. I call it good luck, but we were intended by the Lord to have some good luck. We give thanks for it.

Swent: Right. But you also have to be ready to take advantage.

Clarkson: Take advantage of it. Have the ingredients for it. {And strive for good things so they can happen!}

Swent: That's right.

Clarkson: That has been the--we talked about that before. That has been the course of my jobs right from the beginning. There was opportunity, and I had the good fortune for the opportunity and then I worked to make the most of it.

Swent: You certainly did.

[tape interruption]

Swent: All right. We're getting started again now after a very nice lunch with Edna and Claudia. I'd like to talk some more about the architecture of your plant here. How was it different from the earlier one? You've already talked about the construction in the roof, but was it larger than your plant had been in Palo Alto?

Clarkson: Oh, yes. We should have made it a little larger than we did [chuckles] because we keep squeezing out more space in the existing building, adding office space.

The Sparks Plant: More Than Twice as Big

Swent: How big is this building?

Clarkson: Forty thousand square feet is the footprint, with another ten thousand in the second floor offices.

Swent: What was the one on Bayshore?

Clarkson: Bayshore was about 17,000--[this is] more than double the size.

Swent: And did you also add employees? Do you have more people now than you did then?

Clarkson: Yes. We're up in the 125 range of employees now.

Swent: That's full-time.

Clarkson: Well, over a hundred full-time, and then temp employees make up the rest.

Women Employees, Even in the Shop

Swent: And you now have women in your shop.

Clarkson: Yes. In the shop and very dominantly in the office.

Swent: But also in your shop. When did you first start getting women in your shop?

Clarkson: Well, not the shop per se, in shipping. The first woman in the shop area was in the shipping, warehousing area, which we consider that a part of the production area. Currently, we have one woman that is a machine operator--{now two.}

Swent: Yes, I remember seeing her. How long has she been there?

Clarkson: I think about two years now. Time flies. She could have been maybe three.

Swent: How did you happen to hire her?

Clarkson: I can't tell you that because that is Omer's domain. Of course--

##

Clarkson: --heard about her. She might have applied. I just don't know. I can't always keep current about our people--over 100!

Swent: No, not any more. Now about the building. Your office is upstairs. Did you consider having it downstairs?

Clarkson: No.

Swent: Why did you select upstairs?

Clarkson: Well, it divided up with the accounting people and supervisory of the shop area. The real active things with the flow into the shop--shipping and receiving and all of that--the accounting is all downstairs and the engineering that is associated with the shop and so forth. And the upstairs is

predominantly sales people--the advertising material and major meeting room, the training room, and the senior staff that is involved in the top management and sales is predominantly upstairs. But now, with the mezzanine being updated to an office area, it looks down on the shop. All of the occupants of that new office area are some type of shop supervisory people. From there, they can look down on the shop operations.

Lunchrooms, Smoking and Non-Smoking

Swent: And you now have a couple of lunch areas.

Clarkson: Smoking and non-smoking rooms, as well as outside patio area with bench tables and so forth, so when the weather is nice, people can be outside with their lunches.

Swent: Do you have a separate dining area or eating area for your staff?

Clarkson: Except we utilize all--we have a library room and the training room, which is the big room, as well as--we had a board room that was a small room, so with the mezzanine development, we took a little bit of the mezzanine area for a new board room. It has facilities in there, like a refrigerator and coffee-making facilities and so forth. The downstairs lunchrooms both have vending machines for sandwiches, etc.

Swent: Do you ever eat lunch with your workers?

Clarkson: Well, on special occasions. The lunches like you experienced that we bring in were for special events, which might include shop workers and might include research and development or might be a sales group. When we have a big training meeting, like for reps coming in from all over the world, why, people--different ones in the shop are invited to be with them, so it helps in the education.

Associates, Not Employees

Clarkson: We try to call everyone associates, rather than employee, because we try to make everyone familiar with what everyone else does, so it gives them a feeling of being a part, a key part, of the whole, so they don't have these level distinctions

between the janitorial person and top management. We try to keep a good level of association from everyone.

Swent: You have shop--well, I don't know if you use the word "shop supervisor" over your production area, for instance.

Clarkson: There are several different supervisory areas: shipping and receiving, machine shop, rubber shop, painting, Q.C., assembly, all with associated functions. We work three shifts in some work.

Swent: Yes, so you have your shift foremen.

Clarkson: Supervisor. Sometimes they're called lead men.

Swent: When you have one of these lunches that you mentioned, when your reps come in from outside, who gets invited in to eat lunch with you?

Clarkson: Someone that might have their work that they should know something about what goes on, where the valves are used.

Swent: Where do you have this lunch? Where do you eat this lunch?

The Annual Barbecue

Clarkson: We have an annual barbecue. That's for everyone. We used to go out to a park area, but now we have it catered right at the plant, so they can be inside and outside--more practical.

Swent: Is it in your fabrication area? Where do you have it?

Clarkson: If we have to have it inside, it's in the shipping area, where the big bays are that will accommodate the entire crew. {Or a combination of outside and inside for seating etc.}

Swent: Do you use that upstairs lunch area for that sort of thing ever?

Clarkson: {Usually just for business meeting groups, catered.} Well, in the big room upstairs, the training room, when bonus checks are handed out, for example, we can't have the entire crew in all at once; we have a certain section of the shop crew and then the office people, and then maybe the shop might be divided up into two sections, like shipping and the rubber and things like that.

Swent: You would have that upstairs, in that room?

Clarkson: In that room. Sometimes we need audio facilities to show figures and events or something up on the screen.

Swent: Where does Curt customarily eat lunch?

Clarkson: Well, we often have visitors to take out. Activities of his, with the hospital, St. Mary's Hospital Foundation--

Swent: If he doesn't go out for lunch with somebody, where does he eat lunch?

Clarkson: He eats it right in his office.

Swent: And where does Hank eat lunch?

Clarkson: Same way. They do things sometimes, take a lunch, maybe sit down in the lunchroom.

Swent: Which lunchroom?

Clarkson: The non-smoking lunchroom.

Swent: The one downstairs.

Clarkson: We actually don't have very many smokers. The heaviest users of the smoking lunchroom come from the shop crew. There's no smoking--they can smoke in some areas of the shop when they're working, but there's no smoking permitted in any of the office areas. If an office person smokes, they have to go to the smoking room or outside.

Swent: I guess what I'm trying to get at is do you have some sort of area that is designated as an executive dining room?

Clarkson: No.

Swent: Nothing like that.

Clarkson: No.

Swent: If Curt brings a lunch from home, he eats it either at his desk or downstairs?

Clarkson: Downstairs, with someone. Because there's someone to carry on a discussion with, even talk some business at lunchtime. That's the way that's done.

Swent: Where?

Clarkson: Wherever might be convenient to do it. Except for the two lunchrooms, there's no designated area. We just do it where it's appropriate to do it, like having a birthday cake. The kids, when they have their treats, they have it up in the training room.

The After-School Program for Children

Swent: Let's get into that now. We haven't mentioned this after-school program that you have now. When and how did that come about? Had you done that in Palo Alto?

Clarkson: No. As the crew grew and there were more families with young children, why, Curt--the university--UNR [University of Nevada-Reno]--started a program. They had a term for it, but I can't say it now. But anyway, while Curt was thinking about it and I think Hank and Roger--

Swent: Who is Roger?

Clarkson: He's the vice president of manufacturing and finance.

Swent: What's his last name?

Clarkson: Roger McMillin. Roger is our financial officer, but he had so much manufacturing experience, he has taken on the additional role of being in charge of manufacturing. And then he has the controller under him--John Moser.

Swent: Did he move up from Palo Alto also?

Clarkson: He started with us in Palo Alto.

Swent: So this after-school program is under him?

Clarkson: No. Curt and Hank are in the school program. But the way that developed--we thought about having a childcare center for our employees, for the little kids. UNR started a program for after-school counseling, so Curt liked that. It was actually initiated by UNR, of remedial reading and so forth. It turned into being an after-class rather than a daycare center.

Activities with the University of Nevada-Reno

Swent: How had Curt gotten involved with the university?

Clarkson: He's on the engineering board. Of course, our big involvement at the university is the Mackay School of Mines. We financed a research lab program up there. It is called a slurry lab.

Swent: This must have come about after you moved up here.

Clarkson: Oh, yes. We didn't have any--we had junior college activity. In my early days in Palo Alto, the Stanford College of Mines then, earth resources--I knew people then of the old school. And then they discontinued as far as the old College of Mines there retired and they then had more of an interest in what we were doing, we had some activity. And then it changed over to mineral sciences, which was mostly the petroleum geology--backed by the petroleum interests. So mining per se was pretty much phased out at Stanford.

Swent: But you say when you came up here, what sort of connection did you have with the university?

Clarkson: Well, the U.S. Bureau of Mines had a research lab and a base here. I knew quite a few people--some UNR Mackay alumni.

Swent: Did you just drop in and call on them?

Clarkson: Yes. And they called on us because they knew my background and everything, so they were glad to have us here. {My first contact with the U.S.B.M. was during 1937 having test work done on Buckhorn Ore.}

Swent: Why did they call on you?

Clarkson: Well, just for however they might help us, we might help them.

Swent: Yes, but how has that developed that they helped you?

Clarkson: Well, in student--they were interested--metallurgical students. So our field was slurry handling, the valves. Also, my name was connected with the hydrocyclone development, which was a pretty revolutionary change in milling practices. And people that I knew before--

Swent: But what have you done? Have they asked you to come and lecture, for instance?

Clarkson: Well, I've avoided that.

Koh Murai and the Clarkson Slurry Lab

Swent: [chuckles] But specifically, what does this relationship involve? I'm sure they ask you for money, but--

Clarkson: Like our chief engineer, Koh Murai--he's half Japanese; his father is Japanese and his mother is Caucasian--we picked him up since we've been here. Somehow Hank got onto him, I think through Hank's ballooning. Hank is also a balloonist, and I think that's how we found out about Koh.

Swent: Is he a Mackay graduate?

Clarkson: No, he's a University of Michigan chemical engineer graduate and grew up in southeast Connecticut. He has given a lecture or two at the university and high school. But then we gave a substantial grant to the Mackay School of Mines. And then they set up this lab, and that has supported a couple of students' programs. Students that work for us during the summer. But it's called the Clarkson Slurry Lab. It's actually a facility there. Koh is the one that supervises most of that work.

Swent: So you provide an opportunity for training, then, for them.

Clarkson: Yes. And then other things. In recent times, the new education building. We financed two education rooms in the new building, and that's for special education, for youngsters, a program that they have there below college level. It's for children, I guess, that are behind or handicapped.

Swent: But this is at the college.

Clarkson: Yes, at the university. In the new education building, which was just dedicated last year. And then the rebuilding of the library, we participated in. The Mackay Library, which was one of the oldest libraries on the campus. They saved the building, and went all through it--it meets present-day standards for earthquake requirements and all that sort of thing. So we have a lot of activity. Curt on the engineering board and then Koh with this laboratory work that we carry on there.

You met the lady--the new dean.



2880 SUTRO STREET

RENO, NEVADA 89512

(702) 333-5300

286a

RECEIVED

October 2, 1990

OCT 4 1990

THE CLARKSON CO

Mr. Koh Murai
P.O. Box 12037
Reno, NV 89510

Dear Koh:

Please accept our thanks for your participation for our school's physics project on September 25.

Your detailed instruction was superior, and it was a fantastic experience for the students. We not only appreciate your expertise, but realize the extra time you spent on preliminary preparations of getting your balloon ready with the appropriate banner reflecting our partnership with Harrah's required extra on your part. Your on site time from 6 a.m. to 9 a.m. was most generous.

We recognize your commitment to education, but also want to say thank you to your employer, The Clarkson Company, Mr. Curt Clarkson, for making it possible for you to be involved. We appreciate his community support in working with us in creating interest for our students.

Thank you once again for your valued assistance in making September 25 a very special day for Hug High School and the Physics Class! It was a pleasure working with you.

Sincerely,

Tom Owens, Principal

Leola Tucker, Coordinator

pc Mr. Curt Clarkson
Mrs. Lynn Atcheson

*Mr. Clarkson
Thank you very much!
Leola Tucker*

What's In a Partnership?

It's win-win.

It's industry giving students practical experience with "real world" problems and opportunities.

It's students helping industry to test and refine their methods and products.

It's working together to challenge our innovation, ingenuity, and creativity.

The Clarkson Company celebrates the accomplishments of University of Nevada Reno.

Thank you for the opportunity to learn together!



The Clarkson Hydraulic Transport Laboratory at the Mackay School of Mines is used to study the characteristics of slurry in pipelines.

The study findings have helped Clarkson customers throughout the world, including Nevada mining operations and power generation companies.



The Clarkson Company has partnered with the Mackay School of Mines since 1991. Those currently involved with the studies include (standing left to right) Jim Chadwick, a graduate student, Koh Murali, Engineering Manager for The Clarkson Company, Professor Jaak Daemen, Acting Dean of the School of Mines, Curt Clarkson, President of the Clarkson Company (kneeling left to right) John Phillips, a graduate student, and Professor George Danko, School of Mines.

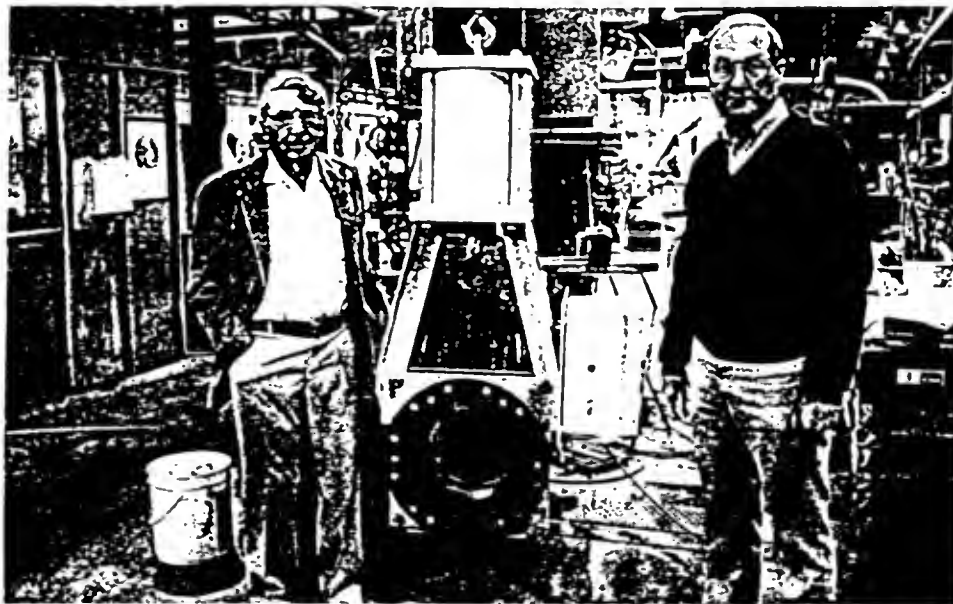
Partnership in Education



The Clarkson Company 650 Spice Island Drive Sparks, Nevada 89431 359-4100

Mackay Trend Newsletter

WINTER ISSUE 1995



Bob Clarkson founder, and his son, Kurt, President of the Clarkson Co.

DANKO HELPS LOCAL COMPANY

Economic development efforts in northwestern Nevada by groups such as Economic Development Agency of Western Nevada (EDAWN), are focusing on attracting businesses that not only will be light users of our limited water supply but will help to diversify the economic base. Many of these industries need the resources conveniently provided by a local university, both for expertise and labor pool.

The Clarkson Company, a manufacturer of slurry valves, moved to Sparks in 1986, in part to be in close proximity to the Mackay School of Mines and has supported research totalling \$100,000 at the school for the past four years. The research, under the direction of Dr. George Danko, Assistant Professor, Mining Engineering, involves testing the characteristics of the Clarkson slurry valves.

The Clarkson Company was started by Bob Clarkson in 1950. Kurt Clarkson, the founder's son, is now the president of the company and directs the company's manufacturing and sales to countries throughout the world, including China, Canada, Russia, Australia and Latin America. The valves are used in industries like mining,

coal-fired power plants, food processing and paper production.

Slurry, a mixture of solids and water, is run through pipelines as a cost-effective and environmentally sound means of transporting solids as opposed to using a dry conveyor. In plants where material is processed in slurry form, pipelines are used to transport the slurry between unit operations.

The Clarkson Company has no lab setup on its premises and must rely on outside facilities for testing of equipment. The lab set up allows testing of various types and sizes of valves with both water and slurry. Running slurry through the test circuit requires special equipment to resist the abrasive action of the sand on components. In addition to research work, the lab is used as a classroom facility by students in various classes.

Test data measures both performance and durability and is used by the Clarkson Company to help improve their products. The slurry valves operate in a highly abrasive environment with flow velocities up to 50 feet per second. Consequently, major concerns of industrial users of the valves are durability, leakage and wear resistance.

Dennis Bryan Dean's executive board

Dennis Bryan (MSM '72 Geo. Engr.) is the Nevada Division Manager of AGRA Earth & Environmental, a regional consulting geotechnical engineering and environmental firm with offices throughout North America. A registered professional engineer, Dennis specializes in construction materials and industrial minerals.

Dennis received a B.S. degree in geological engineering from the South Dakota School of Mines & Technology in 1970.



In 1978, along with two partners, he formed a small geotechnical engineering firm. Seventeen years later, and a couple of name and ownership changes, he still manages the same office in Sparks, which is now part of an international engineering firm.

Dennis is active in many professional and community organizations, including the Society of Mining Engineers (SME) Industrial Minerals Division Executive Committee. He is currently the Northern Nevada Government Affairs Committee Chair for the Consulting Engineers Council of Nevada and has been active on the Nevada Mining Association's Education Committee.

On the lighter side, he is Vice President of Membership for Hot August Nights (the largest special event in Reno which celebrates the music and cars of the 50's and 60's). He has also spent the last three years as executive producer of Reno's Sheep Dip show, an annual roast of the town.

Dennis says, "I feel a strong loyalty to Mackay Mines. The school provided a firm foundation for my professional career and the people I met there, both fellow students and faculty, influenced and enhanced it as well."

Swent: Jane Long, yes. It sounds as if you've been a tremendous benefit to the university. How has the university benefitted you?

Clarkson: Well, helping to provide future talent for us. We have also had vocational activity with the community college. We give employees the opportunity to upgrade and encourage upgrading their skills, vocational skills, at the college level; the community college level helps out on that.

Swent: Let's talk some more about this after-school program for the children of your employees because I think that's a really exciting thing that you've done.

Clarkson: We have an ulterior motive there, too [chuckles], to teach them about the importance of mining. The benefits to society as a whole and try to interest some of them in a future career in mining. So that, in turn, would benefit the university by providing--when they get up to the university level, planning their career and so forth. There's so many kids and people too, they just think the mining industry--they just tear up the earth and dirty the water. [chuckles]

Swent: How many days a week do you have this program?

Clarkson: Two days a week. It's an after-school program. We hire the teacher for that, and he has a couple of high-school-level kids as assistants. Just recently they put a divider in the room so they could break the kids up into two different classes, or they can use one of the other rooms, a little group, if they have something special to do. Just last week we had the last of this semester, for the year. The kids put on a show, demonstrating and acting out what they had done during their semester class period. Each one that participated had to give a little talk about what they had done, some composition along with it. A lot of art work as well as writing.

Swent: How old are these children?

Clarkson: They were first up through sixth grade in the current class, and then the two high school-level kids as helpers.

Swent: And the teacher? Where is he from?

Clarkson: He's a grammar school teacher. Sixth grade Donner Springs School; Steve Howe. He's a regular, full-time teacher. It's an after-school program for him.

Swent: So he's not from the university, then.

Anyone recognize these "Junior Staffers"?

Bob



Roger



Omer



Hank



Curt



Bits to Byte On

The year 2000 is coming fast upon us, and choices will have to be made. We all will have to face it in our own lives, as well as here at The Clarkson Company

One of those choices is to take a look at our current manufacturing system. As some of you know, our current system BAMCS, has pretty much outlived itself. We can stay with BAMCS (upgrading it to be year 2000 compliant), but there are too many holes to keep it afloat and Unisys has told us there will be no more upgrades. So the choice was made to go with the current technology of network based hardware and software

Back in early February, three of the IS committee members embarked on a journey to Chicago to a software show and came back with valuable information. With the year 2000 looming close, the IS committee had to get the ball rolling. The IS committee didn't want to be the sole group for reviewing the new manufacturing system for various reasons, so the users were asked to nominate someone from their department, so that a committee could be formed. The newly formed ERP (Enterprise Resource Planning) Committee consists of the following people: Jamie Carpenter, Dawn Frohlich, Dave Machen (elected point man), Doug Merryman, Leonard Smith, Steve Thomas, and Eric Whitney. They have been meeting for the past month. Their task is to come up with five to six systems to analyze. Three of the IS committee members sit in on the regular meetings to answer any questions, add insight, and make sure the committee is working within the framework of the IS Plan. This committee will be going to Los Angeles in mid September to attend a software show armed with plenty of questions, look out LA!

If all goes well, the committee would like to have it narrowed down to two or three packages by the end of the year, so demos and visiting of current sites can be done. The IS committee will be responsible for the hardware and operating system, while another committee being formed consisting of: Carol Beeson, Mahesh Dundigalla, Jerome Waldman, Mark LaBrie, Nick Williams, and Koh Murai will be tackling the utility and other external packages, some of which are currently in place, making sure they will interface with the new software

Finally, the plan is to have it all pinned down so that the new software can be purchased in Q1 of 1998-1999 fiscal year, with implementation and testing to follow. These committee members' jobs don't end there, as they will be part of the implementation team as well. As you can see, there is a lot of work to be done before the year 2000 rolls around. Where's the aspin!!



Reading, Writing and Mining

On August 15, the children of Clarkson associates, their parents, and Steve Howe, the afterschool program teacher, went on a field trip. They visited the Coeur Rochester mine located 26 miles northeast of Lovelock. The turnout was excellent and the trip was educational and enjoyed by all. They learned all about mining from digging, hauling and crushing ore to extracting gold and silver.

"I liked the pretty rocks", Keri Moran.

"It was interesting and I liked the explosion the best", Keki Ulving

"The explosion was cool. It was fun", Elizabeth Ulving

"I liked the dynamite and the tractors", Devan Taylor

"We liked our Dad's magic tricks on the bus", Carmi and Annie Domingo.

"I liked lunch and watching the ground blow up", Genee Beeson.

"My favorite part was the blast, and I learned that my gomes have silver in them", Steven Sabn

"It was totally awesome with lots of big trucks and bulldozers with a big explosion in the middle of the dirt and dust all over and big bars of silver and we got to wear this really neat hat all day and ride in a nice bus and wear a cool nametag and had a really good time and eat a big bag of potato chips and I drank two sodas", Kyle Smith

"It was quite interesting", Zack Smith.

"It was tight, the trucks were big and the tires were bigger than my dad's. I got to bring home two rocks to see if I could find gold", Chrs Sharkey.

Thank you Curt and Bob for your kindness. The afterschool program starts up again on September 22. If you have elementary school children and would like to participate, contact Sharren.

Have Something to Say?

Maybe a story, cartoon, comic strip or even something to sell. Feel free to submit it to Dawn, Carol, Lynda, Brian or Leonard and you may be published in our next issue.



AUGUST

08/02 MAHESH DUNDIGALLA
08/10 RANDY KIRKPATRICK
08/12 PAUL FINCH
08/16 VALERIE JOCHIMSEN
08/17 LEONARD SMITH
08/23 CAROL BEESON
08/25 ROBERT MILLS
08/25 JOHN MOSER
08/29 ERIC SMITH

BIRTHDAYS

OCTOBER

10/02 PATTI SMITH
10/02 KOH MURAI
10/14 DENNIS OGDEN
10/15 AMY TAYLOR
10/31 DOUGLAS FELKER



ANNIVERSARIES

5 YEARS

BRIAN KAGELE
ERIC WHITNEY



Congratulations to

Sara and Bill Sharkey on the birth of Kaylie Jo on July 5, weighing in at 6 lbs 14 ozs

SEPTEMBER

09/01 JOHN STEBBINS
09/02 FRANK PIA
09/07 DENISE SIMS
09/09 STEPHEN THOMAS
09/13 MARK LABRIE
09/15 GARY BOYER
09/17 DOUGLAS SCHEIDT
09/19 JEFF CALLAHAN
09/21 DAVID RIDGWAY
09/30 WILLIAM SHARKEY

Clarkson: No, no, not now. At first he was, but now he's a grammar school teacher.

Swent: Have you had the same teacher all along?

Clarkson: He's the one we started with it. He helped to develop the program and all of that.

Swent: And all the children are the children of employees that work for you.

Clarkson: Yes, I think about fourteen.

Swent: Is there any charge for it?

Clarkson: Not to the parent, but they're responsible for getting them to class and taking them home afterwards. It also gives the kids a break from their regular classroom work. I think it also enhances some of their maybe problems at regular school. They also get to see what's going on here, what their parents do and what the business world is like.

Swent: I think it's a wonderful program.

Clarkson: It fills a gap that they don't generally have. And there's a new school of mines in Las Vegas. It serves the same purpose, to teach kids of that level. It was initiated just a couple of years ago. The McCaw School of Mines in Las Vegas.

Swent: So you're helping to support that, too?

Clarkson: But it's entirely for mining education--our basic industry.

Swent: I see. Had there been any thought to having daycare for pre-school children?

Clarkson: This was the outcome of that thought, was to carry on educational work rather than just daycare because there's other daycare facilities, and they probably would have more time in a regular daycare than what we could provide.

Following the Bradley Example in Good Employee Relations

Swent: We haven't talked at all about the benefits program that you have for your employees. I think we should mention that. What

sort of insurance and retirement and all those things do you have for your employees? Has that changed through the years?

Clarkson: I'd like to have Omer tell you that. {By the time we moved to Sparks in 1986, our benefits consisted of major medical, dental, life insurance, short term disability and profit sharing plans. Since we have been in Nevada, we have added vision care, long term disability, long term care (i.e. home and nursing home care), and 401(k) plans.

{Our 401(k) retirement plan has been particularly successful. It was implemented in August 1988 with a company match equaling 50 percent of up to 4 percent of each employee's total pay. We have averaged about 95 percent voluntary employee participation in the plan.

{Beginning March 1, 1995, we went self-insured in our major medical and dental plans. A year later, we added our vision care plan. We have been able to add a number of benefits for our employees and their dependents while still effectively controlling our costs.}

Swent: Well, from your point of view, has this changed throughout the years?

Clarkson: Yes, it has. Just recently, a lot of change. The so-called 401(k) plan. But early, in Palo Alto, I started a profit-sharing program. When we first started, the employee contributed 5 percent of their pay, and the company matched that. That was set up as a profit-sharing trust fund.

Swent: Where did you get that idea?

Clarkson: Well, Bradleys. It started with Bradleys because Bradleys, last years at Stibnite, they initiated a profit-sharing program.

Swent: And you liked it?

Clarkson: We thought it was progress. Another thing that Bradleys did about the same time, in that period--it was after World War II, when we were starting to adjust to industry after World War II, progress--they had a professional come in from San Francisco. We were very much non-union, anti-union, there. And in order to show that they were doing it better than unionism, they had a professional come from San Francisco and spend a lot of time with all employees--supervisors, foremen, staff--to evaluate all of the jobs on the job there. The responsibility, what their exposure was when they were out in the cold and had to

deal with sub-zero weather, the elements; then a mill man working inside, their responsibilities. Took days of personnel meeting to evaluate every single job.

From that, this professional, from the evaluation, would determine what their wages should be. Really, it would evaluate whether a shovel runner, for example, in the pit required more skill than a mill man operating mill equipment in the mill or the smelter. They were working inside. What hazard exposures they had. What hazard exposures, dangers that a shovel runner or cat skinner had. And so it came up with wage scales that supposedly satisfied everyone, and everyone knew why any certain person on the job, why they got paid what they did.

And it provided some incentive. Sometimes fellows, what they would love to do over what they were doing--it gave them an incentive to acquire the skills to get up to the job that they would like to be doing. And maybe that job paid more money. So that was a lot of the education that I got in my work with Bradley Mining Company.

I had a real good opportunity to compare because Bunker Hill {Bunker Hill & Sullivan Mining Co.} in Kellogg, Idaho--all the mines there were unionized, so those fellows up there were consul--I was working with them as consultants. We would be exchanging consulting for their expertise, our expertise. We could see how they had to operate in an all-union environment and how we, the southern Idaho mines, the Yellow Pine Mine and the Ima Mine, were both non-union. But the Ima Mine had a neighboring mine, the Blackbird--

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Clarkson: Blackbird Mine. It was a cobalt and copper mine in the Salmon City area, where the Ima Mine was in the Challis area. It was then owned by the Howe-Sound Mining Company.

Swent: So you put all of this to work when you started your own fledgling company.

Clarkson: Yes. Well, I look at it as a good experience, a valuable continuing education to deal with working people. And also sharing. So it made working, an hourly job person, happy with their work because you always have laboring people that are always laboring people, their level of ability and their education and training. Like, a truck driver would--lots of truck drivers were always truck drivers. But maybe a select few, they had the ability, they could get to be a shovel

runner. But that usually was their career. But, still, you wanted to make it known that they were a valuable employee.

Swent: What sort of retirement plan have you had? Or have you?

Clarkson: That's all in the 401(k).

Swent: Before that came in, what did you have?

Clarkson: Profit-sharing trust fund.

Swent: Oh, I see. Okay.

Clarkson: Then we have medical-dental insurance for all the people. Full-time employment. The reason we use temps is because the company's dollars, they don't qualify for any of that unless they become a company employee, and that's one way of getting good employees, because you can work them on a period of temp, six months; if they're a good employee and they want a permanent job, then they can qualify for company employment. If you don't need them anymore, you don't have to go through all the paperwork of insurance and the retirement plan.

Swent: Did you move most of your employees when you came up here?

Clarkson: No.

Swent: How did you handle that?

Clarkson: The ones that we wanted to move and also they wanted. We had about thirty-five, as I remember the number, that moved. Some elected that they didn't want to leave the Bay Area. And then some--I don't remember a number, but at the time it was maybe a half a dozen that didn't fit in here, that didn't like it, that they quit and went back. Some of them, too, didn't have family there, just a single person. But virtually all of our key employees, except some changes that we made, like in Hank's case; but our marketing manager, the first one that I had, sales manager, he was up to retirement age--

Swent: Right. You had mentioned that.

Clarkson: He didn't elect to move. Of course, we thought it was time for him to retire anyway.

Mechanization and Computerization Without Layoffs

Swent: You mentioned this cell method now of manufacture--what did you have before then?

Clarkson: Just typical, old-style machine shop.

Swent: One person would just do one operation?

Clarkson: He would do maybe more than one, but with a run, say, of a hundred parts, he would move on with the parts to run another machine. Like, from a lathe to a milling machine. That would be the next operation. Now it's a cell. One person manages all of that.

Swent: He does one valve from beginning to end?

Clarkson: The part, it just goes around in the cell. He's setting up and watching all of the operations in one spot until it comes out a finished part. He cleans it up and grinds off the--the deburring and things like that, and he does those things. One machine is running and another machine just starting. That's the way it flows through, rather than doing one, picking it up, moving it over to the next one, and doing it there and all those steps like that. In our case, it didn't cost a layoff of any people. But also we didn't have to hire people in the mechanization. One person could accomplish a lot more.

Same way in drafting, with all the computerized CAD-CAM and that--the drawings are put in the computer. They snap out the changes in seconds. Rather than doing a whole drawing over, they do it on the computer. So we were--like you mentioned about the amount that our sales increased--at the same time, we were cutting down on warehousing. At the same time, we were doing things--we didn't need to hire more people to do the design work, drafting work and engineering work. Just simply made them more efficient with the computerization.

Swent: Are you doing more in-house now than you did in Palo Alto?

Clarkson: Yes, we keep adding. That's what vertical--

Swent: Vertical integration?

Clarkson: Yes, like the rubber work. But in our case as compared to the hydrocyclones--we buy a lot more manufactured items, like solenoid valves and tubing and the instruments that go on the valves. A valve by itself doesn't look like very much, until

you get all of the actuating equipment, top works on it. A lot of that accessory equipment comes from outside manufacture.

Swent: I don't understand what you meant about the hydrocyclone.

Clarkson: I'll explain that. It doesn't have all this outside instrumentation. All it requires is piping and fabricated sumps, launders, manifolds that go along with it. So that business doesn't require a big stocking of all the instrumentation that goes along with our valves. The cyclo doesn't require any actuator equipment, where the valves, every job has some, either electrical, hydraulic or pneumatic actuators, or just manual. There's an awful lot of accessory equipment that has to go to make up the complete valve.

Swent: And you buy that.

Clarkson: Buy that, from specialist companies that manufacture cylinders, hydraulic and air cylinders and the electrical actuators. It's all the gearing and--

Swent: Specifically, what are you doing here, in this plant now?

Clarkson: {Build the valves and assemble the complete unit.} A good part of our--all of our machining, the castings, the raw material comes in from different suppliers, different foundries.

Swent: What are the raw materials? Do you get a piece of sheet steel, for instance?

Clarkson: Yes. Stock that we machine, like bar stock, brass bar stock to make the special nuts and the stems for the valves, the threaded stems.

Swent: You do that?

Clarkson: We do all of that here, all of the drilling, tapping, press work and so forth. Some fabricating, like the frames and so forth, we have some of that done outside, because some shops can do it easier. They have all of the equipment that we don't have room for.

The Valve-Making Process

Swent: Let's just go step by step. What do you start with here?

Clarkson: Well, we start with--the raw materials?

Swent: Yes.

Clarkson: We start with castings, lots of castings of different {metal} materials: iron casting, steel casting, aluminum casting. That all comes from foundry works. We couldn't have a foundry. Not feasible. Then the raw materials that are machined: sheet, bar stock and some that's flame-cut from flat stock.

Swent: Do you flame-cut here?

Clarkson: Yes, we do some flame-cutting, unless it's something special. And now we have the machining equipment tool shop to make our own tooling and dies, molds and so forth. We make some molds, our own molds, to go to the foundry. And rubber molds and then the various tooling, holding and fittings--fixtures, they're called. We do all of that.

Swent: You took me through your plant, and I saw them doing things, but I wanted to know what the words were for these steps that you go through.

Clarkson: Oh. Of course, we go through all the cleaning; parts after machining have to be clean. Some have to be sandblasted *before* machining. Then all of the painting; that comes along with the assembly work. We don't do all of our rubber work, but we do a big part of it. We get into the real large parts, we don't have the room. It isn't justifiable to put in the facilities for the small quantities of some parts.

Swent: How large is large?

Clarkson: Oh, say from twenty-four-inch pipeline size valves up to forty-two inch. That's the largest size.

Swent: Your largest valve is a forty-two inch valve?

Clarkson: Forty-two inch, yes.

Swent: And for that rubber you would have to send outside?

Clarkson: We have that done outside. And also, there's a motive there, too. We like to keep a good rubber supplier in the event that we have an emergency and we have to depend on them--our main one is in Lodi. We've always had, right from the beginning, had business there. That company {Holz Rubber Company}--and the founder {Bill Holz} has long been dead. It has changed

hands four or five times, but we have still been able to retain a good relationship with the management.

Swent: That's wonderful.

Clarkson: Because there's some that have gone from one to the other.

Swent: How did you decide on this distinctive color of your valves?

Clarkson: Well, some plants specify a color. But we decided on a color that seemed to fit our--it's hard to explain just how--

Swent: You did tell me once. I think you have changed the color.

Clarkson: Yes, it has gone through changes. Like our logo. I designed the logo and then had it copyrighted and so forth. But it's something that you select that seems to fit. {Some well-known products are recognized by a certain color.}

Swent: And what is your color now?

Clarkson: It's a green. I call it a pleasing shade of green, kind of almost a St. Patrick green. A little lighter color than what's commonly recognized as St. Patrick's color. But then, on request, why, then we paint the specified color.

Swent: But your traditional valve is the green one.

Clarkson: You get comments on color. Some we have tried, some would say, "Oh, that's a terrible color. How come you're using that?" It's like Caterpillar. That has been Caterpillar yellow. It's accepted around the world. Cubs. That was Piper's choice, too, for many years. It was pretty close to the Caterpillar yellow.

Swent: Yes.

Clarkson: And Clarkson green is--some of my Irish ancestors--Grandmother Clarkson. A little of that must have seeped out there.

Swent: It's a good color, yes.

Acquiring an Education Without Going to College

Swent: You have talked some about education, but have you ever felt the lack of a university education? How do you feel about that?

Clarkson: Yes, definitely I feel the lack--(especially when others talk about their college years.)

Swent: You have done awfully well.

Clarkson: I've always worked around it because I do what--if I was challenged with something, I would get boned up on it {do necessary home work!}. As I have said before, that came from friends, mentors, like Otto Brown. Of course, we were in age groups together, and I worked with him, and from their formal education, they often taught me the things I needed to know and to do what I had to do. So I have always made it work. And I knew I could never take out the time. It always seemed to me like if I quit doing a job out on a mining job, why--and I always studied the things that I had to do to successfully do a job, you might say. So I got by, by doing it that way. I guess being a busy person, I never wanted to stop doing what I was doing to go spend some time trying to add a formal education record.

As I look back, maybe to the disadvantage of some, like Kelly Krebs and the subsequent Krebs Company. I've kept important records. Then, when I look back on my reports and so forth that I made on a job, I couldn't even start to do it now [chuckles]. I've forgotten so much that I dealt with then. But anyway, I am proud of the fact that every mine job I left or finished, I always left it with a happy record, with my former employers, of the different jobs that we talked about, like the partnership with Ted Edinger. I told you about that.

Swent: Yes.

Clarkson: I was offered this good job in Arizona, and then there was reason for him to go back to the shipyards because of his background in that, work for the war effort, and then he later started up, carrying on our partnership alone. He started back up with a little shop in Grass Valley for his son. They had just one child, a son, and the son--he left the business to his son, but his son didn't do too good a job with it--(didn't carry on with ability of his dad).

Swent: That's too bad.

Clarkson: He kind of got carried away. Like, I gave him some guidance to go to college in Idaho, at the college, {liberal arts}, then the College of Idaho, in Caldwell, Idaho. And it was a kind of school that he wanted to get into, and then after he finished school, why, he ran the shop. Ted was still living. He did a lot of our first cyclone fabrication because we didn't have a shop yet, and so had him up in their little Grass Valley shop. Fabricated the cones and some other parts, and thus helped out a whole lot. He would ship the stuff we needed in Boise and then when we started doing some in Palo Alto, would come down with his truck and bring the parts.

Then Ted died--a heart attack--in that period. And the son Teddy took over the business. Well, what Teddy got was a good start. They also had started specializing in bumpers, rear bumpers for pickups. They were fabricated with the diamond deck on top of them for steps, and then he and his dad built some of the first pickup shells. You know what a shell is.

Swent: Yes.

Clarkson: And they had a good business doing that. But Teddy (was the junior), he finally had to sell it. He moved to Denver. He had a shop in Denver and then I lost track of him. But he didn't do too well in carrying on. {He was talented but lacked the stability of his dad.}

The University of Idaho and the Bradley Memorial Scholarship

Swent: We haven't mentioned yet your connection with the University of Idaho. You have been quite active up there.

Clarkson: I'll show you some of that.

[tape interruption]

Clarkson: A cousin and nephews went to the university, but not in mining. The fellows, early work in Stibnite, like Otto Brown and Jim Lange with the Galigher Company. They've all passed on now. Were fellows that I worked with, mentors, that gave me lots of help over the years. And others, another one, Frank McKinley. The McKinley family grew up in Kellogg. There were three brothers, and they all were mining and metallurgical. Frank McKinley. I worked with him a lot when I was at Stibnite. He was assistant mill superintendent for Bunker Hill in Kellogg, and then he went on to head up Humphreys Engineering in Denver.

And so we were, over the years, until he died, very close friends, as well as his brother. Harold McKinley was manager of the U.S. Vanadium, the tungsten mine over by Bishop, California. It was well known. Later became Union-Carbide Nuclear Company. He retired from that. And the third brother {Archie} was involved in--last involved uranium area in Wyoming.

And fellows like that. They were University of Idaho alumni, as well as the deans. The first one that I got to know was a flotation man, Dean Fahrenwald, A.W. Fahrenwald. He was the dean of the College of Mines there for years, starting in the late twenties, I guess, into the thirties. And then others that were deans there. The new dean--I've got some acquainted with him on the phone and by correspondence, but my real activity there started with two of us, Emmons Coleman--he was also a University of Idaho grad, electrical engineer. When Jack Bradley and his wife were killed in the auto accident in San Francisco, we decided to start a memorial fund at the university, in memory of Jack and Jane, his wife. Her father {Stanley Easton} was also an eminent Idaho mining man. So we started that, and I continued with it. Emmons has since passed away. We got almost all of these people I worked with. We memorialized him {Jack Bradley} with this student assistance fund.

Swent: I think you sent me a copy of this.

Clarkson: It's marked up. I had to have some corrections.

Swent: That's all right. That was a wonderful thing to do.

Clarkson: Well, I've been happy with it. If we hadn't have done it, I don't think it would have ever happened, so that's the reward.

Swent: It says the memorial fund now has \$1.6 million, generating \$98,000 per year for scholarships. That's really a significant amount to help students.

Clarkson: It has grown very well.

Swent: That's wonderful. And all these people--

Clarkson: It required a \$500 contribution for each name, and I got fellows, companies that we did work with, that they had worked with--I solicited contributions from them to get the \$500. I didn't always contribute the \$500; I solicited to get them, to get a name so honored on the Idaho Memorial list.

Swent: That's a wonderful thing to do.

Clarkson: That's what glues my association with so many in the profession.

Community Service in Four States

Swent: Wherever you have been, you have contributed a great deal to the community, obviously.

Clarkson: Well--

Swent: Idaho and California and Nevada. Three states.

Clarkson: You get an awful lot of satisfaction. Idaho, Nevada, California, and Arizona, {and, not the least, around mining areas of the world [chuckles]!}

Swent: What have you done there?

Clarkson: The Arizona Historical Society. There has been some minor contribution. But there's a lot of historical material on the Grand Reef Mine because that was in the John Mackay estate. It had been a notable producer during World War I. That's when it had its heyday. It didn't really develop into having another heyday during World War II, but still, it had quite a history because in the early planning, there was plans to build a railroad into the area and some pretty big plans for it. But then the war {WWI} ended, and none of that was realized.

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Clarkson: It had quite a World War I period history, but that was the end of it. But these records that I turned over to the mining, historical, in Arizona, that could have been lost.

Fishing and Mischief After Hours at Stibnite

Swent: This goes back, again, to Stibnite. But there were a couple of things I wanted to pick up on from earlier interviews. You had mentioned at one point, in speaking of Hank Bradley, you enjoyed working with him, that he was the flotation operator and you were the ball mill operator and then you also said you

had a lot of fun together after hours. What did you do after hours that was so much fun up in Stibnite?

Clarkson: Fly fishing. As fast as we could get to our favorite fly fishing stream. And some salmon fishing. And some of it was a little bit mischievous, too.

Swent: Well, maybe time has passed enough that you can tell about the mischief.

Clarkson: Well, there was one big hole in Johnson Creek. Johnson Creek was really a river-size stream, a tributary of the Salmon River. There was a big hole there that had an awful lot of whitefish in it, schools of them, and some trout. So winter was coming on, and I had the idea and Hank eagerly went along with it. We got a stick of dynamite and the necessary caps and fuse, and we fixed about a quarter of a stick. Cut a charge down to about a quarter stick. Put it in the hole and blasted. That brought a lot of whitefish to the surface and a few trout [laughs], and we gathered them up and put them in a washtub. Then I salted them down, fixed them up for the winter. Today, sure, we'd be in jail for it. But then, back in the early thirties, someone would say, Well, those guys have been up to something. And that's about what it would amount to. But if you put some dynamite into a fish hole today, you can imagine all the trouble we'd be in. {The fish were not wasted--plenty to give away!}

Swent: I suppose you would be in real trouble, wouldn't you?

Clarkson: But we decided to do that. Between us, we thought it would be fun to do. But then, during the salmon runs, those big salmon runs in the tributaries there, we didn't fish for them with poles; we speared them. That was a lot of fun, too. I've got some pictures around--

Swent: What sort of spear did you use?

Clarkson: Well, we also called them a gig. Made them out of a pitchfork or four-tined pitchfork that made it look like the devil's spear. The blacksmith put a barb--cut them off so the tines were about six inches long, and then the blacksmith put a barb on each one of the four tines, and then we got a long pole, about ten or twelve feet long, and instead of just the fork handle, we put a longer pole on them, and we could spear the salmon in the deep holes and pull them out.

Swent: For heaven's sake. They were so thick that you could just go down and--

Clarkson: Oh, yes.

Swent: You would get four at a time?

Clarkson: No, just one. {And awfully wet too!}

Swent: [chuckles]

Clarkson: That's the way. We always had a good supply of fish, either whitefish or trout or salmon. {Some to give away too. Not everyone bothered to fish or hunt.}

Swent: But then at least you ate them. You weren't just wasting them.

Clarkson: No, we were meat hunters. It was approved for prospectors then, to get camp meat. Kill a deer during the summer, for meat. But also I was brought up as a meat hunter, not to kill just for the fun of doing it, except rodents. We killed rodents for the fun of doing it, or a coyote or a marauding bear or anything justified like that, we killed. But not just for the fun of doing it. {Rodents like groundhogs and even sagebrush rabbits could destroy a lot of crop in the lower areas.}

Pumping the Mill Tailings at Stibnite

Swent: You also mentioned another thing that we didn't follow up on. You said that there was a problem pumping the mill tailings at Stibnite. You didn't say what the problem was.

Clarkson: Well, everything at Stibnite, the Yellow Pine Mine, everything was backwards, uphill. {However, pumping the tailings upstream to a larger site came during the late forties along with the mill expansion.}

Swent: We talked about that a little bit.

Clarkson: The mine was downstream from the mill, and the only feasible tailings disposal site remaining was upstream from the mill. So one of my last projects--well, it came about the end of World War II--was preparing for a new tailings disposal system. But it also was for increased tonnage, doubled tonnage, from 1,200 tons a day up to 2,400, with the new rod mill and the new crushing plant and all that. Then there was a project to design a pumping system, build the berm area, and a bypass

canal to carry the Meadow Creek stream around the tailings site.

But also, in studying pumping, it was a mile-and-a-half haul upstream from the mine to the mill, along with planning for the increase in tonnage at the new crushing plant and the rod mill, thought was given to locating the rod mill at the mine site and then pumping up from the mine to the concentrator, instead of trucking. The reason for considering that was heavy snow conditions in winter and snow wouldn't make any difference to a pipeline. Since we wouldn't have to maintain a lot of snow removal on all that road surface. But in the feasibility study it just didn't work out--too inflexible.

Rail haulage was also considered because there was an opportunity to buy a good used mine rail system. The trucks proved from experience to be more versatile and required just about the same amount of grading to provide a rail grade as a truck grade road, and then if it's a rail grade, you couldn't be driving utility trucks and even bosses driving back and forth between the two facilities and all of that, so trucking prevailed--and all its subsequent designing: the bins at the mine and the bins at the mill were designed for truck haulage and to maximize their movement time, too.

Swent: So it wasn't the pumping per se that was the problem.

Clarkson: No. But the only pumping that remained was pumping the tailings upstream, and there was no other choice on that, so I gathered a lot of experience there because Bradley sent me and some of the other staff back to the Iron Range. And Ottawa, Illinois, Silica Sand, and Climax. The latter was more for crushing, milling and conveying design. That was--well, Magma Copper, Bingham Canyon, Utah, because they were using rail haulings there, and the climate was much the same: snow and sub-zero temperatures.

Swent: At Magma?

Clarkson: Yes. From the pit, the big pit. They had rail haulage down to the Magma mill from the pit area.

Swent: Magma? {Correct}

Clarkson: No, Magma. Magma Copper. {in Arizona at Superior}

Swent: I thought that was in Arizona.

Clarkson: Well, Kennecott--the pit in Utah. {Bingham Canyon}

Swent: Right.

Clarkson: Garfield. Yes, that was the name. {Garfield Smelter}

Swent: Magma, I think, is down in {Superior, Arizona}.

Clarkson: That's the only Magma operation. {Magma Copper Co. in Superior, AZ.}

Swent: But it was up in Utah at that time?

Clarkson: Yes. BHP has Magma in Arizona now, at San Manuel.

Swent: Phelps Dodge is at Morenci.

Clarkson: And Phelps-Dodge.

Swent: That's Magma.

Clarkson: Yes.

Swent: I think the one in Utah is Magma. {Correct!} Is it? I don't know. We'll have to look that one up [chuckling]. At any rate--

Clarkson: I'll have to refresh my memory. {Magma in Utah}

Swent: Yes, they had similar problems, but you decided against the rail.

Clarkson: Garfield Smelter. Then Utah Copper, the big pit, {Bingham Canyon}, where the ore was coming.

Swent: Yes, okay. No, I think you're right.

Clarkson: I get corrected on things.

Swent: Well, I'm sure you're right.

Clarkson: The old memory gets stale. {Chuckle chuckle!}

[Editor's note: Bob: This was the only time in 19 hours of interviewing so I wouldn't let it discourage you. I wish my mind were half as sharp as yours! --E.S.]

Swent: The Stibnite decade was one of the high points for you, wasn't it?

Clarkson: Through the forties into the fifties. That's when tungsten {at outset of WWII} was discovered. They were looking for more antimony and discovered the tungsten. {Without a doubt that stint was the peak of my mine work career.}

Very Few Accidents at Stibnite

Swent: Was anybody ever killed there at the mine? What happened if there were widows or--

Clarkson: They had insurance for that. Like, the Lloyds of London insurance.

Swent: I was just thinking, where it was a completely company town like that, if the family was left without the wage-earner and they had to get out of the company house and they just had to move away? Did that ever happen?

Clarkson: Well, as I remember, that never happened.

Swent: Really.

Clarkson: At the Ima Mine, {also a tungsten producer but underground} two fellows--one of the young engineers--on their own, they went back into some of the old workings, and got into bad air and couldn't--one passed out. One made it out, but one died. And earlier, when Edna and I were at Stibnite in the thirties, one of the development tunnels near Yellow Pine, a separate operation the Bradleys had developing an antimony deposit, they had a crew, just a crew of three miners working there and one shift. There was three working together underground. One went out for something, and two were still working at the face, and there was a cave-in that killed both of the two fellows that were working there. And the fellow that had gone out to the portal for something--I don't think it was--he might have gone for powder--when he came back, the cave-in had occurred and the two fellows were buried. That was the only deaths in that period.

Once, one fellow was killed by a power shovel accident. A shovel backed up onto him. He stepped in behind it when it was moving. That was the only--{probably stumbled or fell and was caught by a moving track}.

Swent: What happened to their families then?

Clarkson: I just don't know. In that period, the company had a hospital, a company doctor and all the facilities. I don't remember whether that fellow even had a family there.

Swent: Maybe not.

Clarkson: Maybe not, because always something could have been done, but there was never any really tragic events during all that period. It seemed like everyone that worked was pretty experienced and pretty well qualified in their jobs. {Mine safety training was a regular requirement.}

Drinking Was Not a Problem

Swent: You talked about drinking, that they didn't allow drinking at the Bradley properties.

Clarkson: In the thirties, the manager then of the mine--of course, that was his orders. That was Prohibition time. {Volstead Act}

Swent: What about the forties?

Clarkson: The forties. Well, Yellow Pine, twelve miles downstream, the bars were down there. The company didn't permit a bar until liquor was made available in the recreation hall, along with the bowling alleys and the theater. Was all in the--bar drinking was permitted then, but a fellow was in trouble if he came out on the job. {The bartender had to be responsible too.}

Swent: What about your parties in the late forties decade when you were there, until '52? Was there a lot of drinking at the parties?

Clarkson: No, no. Not really. There were cocktail parties, but they were pretty well controlled.

Swent: Some of those mining camps got pretty wild sometimes.

Clarkson: Yes, they did. But it wasn't--when a person got out of hand, like at the dances, one might--a fight might erupt outside. One time a couple of fellows and a woman were involved in that. Got in a fight outside the recreation hall. The woman took off her high-heeled slipper and [laughs] hit one of the guys over the head with her slipper. He didn't have a concussion. But in that period we had a constable there. We didn't have a jail

or anything. But he was also a sheriff's deputy, and he went up and straightened them out and sent them home.--(or else!)

We had two or three alcoholic problems. The fellow that was my chief design engineer {John Nicholson, U. of I. graduate, mining engineering. Previous to Stibnite worked for Boeing in Seattle. Back to mining!} had been an alcoholic. There was a Shadel's sanitarium for drying them out in Seattle. That's where he had been dried out from his drinking problem. And so he was always ready to help anyone with--well, I had one other fellow on my crew that was a skilled laborer, mechanic, that had a drinking problem. He had a family, too, which was a burden on his family. We took up a collection and the company matched it and sent him to the sanitarium, Shadel's in Seattle, and got him dried out, and he as long as I knew him after that, he {stayed on the wagon. Dick Leahy--and of course a hard-working Irishman.}

But some that had drinking problems straightened out their problems on their own because of family and other pressure.

Swent: What about the wives? Were any of the wives--did they drink too much?

Clarkson: No. Really, I can't recall any. Maybe they had a little too much at a party and they got a lot of kidding about it afterwards, and that [laughs] usually served as the cure. But both the operations there--like the Ima Mine. When the company bought the mine operations, the town site, Patterson, Idaho--it was a government project to build up the town. Housing was built by the War Production Board. There was three bars in town when the company bought it. And Tony Mecia went there as the manager. Immediately got rid of two bars [chuckles] at the time because he had the power to do that.

Swent: Usually, the manager sets the tone in those things.

Clarkson: What they said about it was the bars had three shifts at the mine: one shift coming, one shift going, and one working. And the shifts ended at the bars [chuckles]. And so the shift coming off wound up at a bar before going on home or the bunkhouse.

And then the other problem that had to be dealt with was the school and the ranchers out in the valley. The old company had let some tailings get away and go down the stream, and they had tailings going into their ditches. They were mad about that {and ready to stop the works--they had put up with it during the war years}. So that was one of the first things

that Bradley Mining Company was confronted with: what are you going to do about those tailings? {Public relations!}

Tony sent mine crews together to go clean their ditches, and we designed a new--I was involved in all of the mill design work, remodeling the old mill and that sort of thing. So they developed good public relations to make the ranchers downstream happy. They, in turn, after a while, they accepted the mining company as a good neighbor.

Betty had quite a bit of participation in the school. She and other mine wives got problems straightened out in the one-room school.

Swent: That's Betty Mecia.

Clarkson: {She was also a Stanford grad.} Stibnite was the headquarters, you might say, for all of that operation because for updating the mill and the mine and metallurgical work, that was added on to our Stibnite duties. {Much of the travel between the mines was by air--company planes. Over some of the roughest mountains in Idaho!}

Granddaughters Brenda and Kristin on the Board of Directors

Swent: We're just about to have to stop, but I wanted you to talk about--you have two granddaughters now on the board?

Clarkson: Yes--sure!

Swent: Has Claudia been on the board?

Clarkson: No.

Swent: You skipped a generation there.

Clarkson: Yes, to the granddaughters. Curt has been on the board, and Omer. But not Claudia.

Swent: But one of her daughters is.

Clarkson: One of her daughters, and one of Curt's daughters.

Swent: I see. What are their names?

Clarkson: Brenda. She's the business gal {with a college degree-- Westmont College, Santa Barbara. Worked for Krebs Engineers for several years--wanted to remain in the Bay Area.}

Swent: Is she Claudia's daughter?

Clarkson: No, Curt's youngest.

Swent: She's Curt's younger daughter.

Clarkson: Yes.

Swent: Has she been on the board the longest?

Clarkson: No, they both came on at the same time.

Swent: When was that? Recently?

Clarkson: Last year.

Swent: Just last year.

Clarkson: In '97.

Swent: Brenda, and what is the other one's name?

Clarkson: Kristi. Claudia's oldest, Kristin.

Swent: And it's Kristin King.

Clarkson: Kristin King Morana. {A Cal Poly at San Luis Obispo grad, her dad's alma mater. Also her husband--Horace.}

Swent: M-o-r-e-n-a?

Clarkson: -a-n-a, Morana. And Brenda is Nordin. Brenda Clarkson Nordin.

Swent: And they both now are on the board.

Clarkson: Yes.

Swent: But Kristin is the one you think is more business-like?

Clarkson: Well, yes. Her sister, Karen King Richardson, she's the nurse. She's an R.N. But Kristi, she has worked after her college years. Before she was married and after, she worked in business jobs. And so did Brenda. Brenda worked for Clarkson Company, then Krebs Engineers. She quit her job and became a full-time mother when Krebs moved to Tucson.

Swent: Where does she live now?

Clarkson: Fremont, California.

Swent: Brenda lives in Fremont. And Kristin?

Clarkson: San Jose.

Swent: San Jose. And Karen?

Clarkson: Woodland, California.

Swent: Woodland. And the other one lives in Palo Alto?

Clarkson: Well, she actually lives in Mountain View.

Swent: Mountain View. And what is her name?

Clarkson: Cheryl. {A P.E. teacher and coach in the Palo Alto school district. Married October 3, 1998, culminating a three-year courtship. Groom--Robert Lee Trotter.}

Swent: So you have your next generation coming in. They're women. Women are going to take over the world, Bob. You know that!
[laughs]

Clarkson: No Clarkson males.

Swent: Well, you have done a wonderful job.

Clarkson: That came from grandmothers too!

Swent: If you had it all to do over again, what would you do differently?

Clarkson: Can't think of anything.

Swent: I wish we didn't have to stop, but I'm afraid we do.

Edna C.: Does it bother you to see all the women, like in broadcasting? I don't know. I like to have the men have their share. It seems like there's so many women in broadcasting and not men so much any more.

Swent: Really?

Clarkson: It's a different working--well, in mining. Going up to Coeur [d'Alene] Rochester Mine, where we took the kids. Women driving the big shovels and the big pit trucks. You see that

everywhere that you go. Well, they can do it now because everything is power-assisted. Back in my pit mining days and underground, it required manual muscle. There wasn't any hydraulic steering on a mine truck, pit truck. And mucking by hand. It all had to be man's jobs, unless a woman was very masculine. But now everything, like flying a 747, it's all mechanically assisted, so all it requires is the dexterity and brain skill too, and liking to do that sort of thing. {And of course pay too!}

Swent: That's right.

Clarkson: That's what I attribute a lot of change to. We didn't use to consider it safe for a woman to be out doing a lot of things. You wouldn't let them do that.

Edna C.: At our church there's a young man that's a radio announcer, and he's very well talented and all. His wife is a qualified 747 pilot. They have a little boy about eight, and they've adopted--I don't know why they adopted, but they have an adopted little baby, under a year old, and the father takes care of the children while she goes on trips. She's on different--I think it's the FAA manager in Reno. She's gone a lot, and is maybe away maybe a week and then home a week or something. When she's at home, I guess she takes care of the children. But when she's gone, he takes care--it just seems so unusual--{unreal?} {Come year Y2K--C. Co's fiftieth anniversary!}

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Clarkson: Yes, ^{to} ~~at~~ Butte. ^(further time) Made two trips ^{in a day} ~~out of it~~ To Kellogg with ^(*didn't have enough parts first time) centricle parts. Our first adventure into cyclone work, Kellogg Krebs found a mechanical engineer ^{Norris Goodwin} in San Francisco that had patented a mechanical hydrocyclone. It had the impeller built into it. And we acquired the rights on that patent. One of the ^{early} ~~first~~ units that ^{we} ~~it~~ put in was in the Bunker Hill mill. ^(after still tests) So I flew up there to help them out with it after they installed it and ^{to} ~~get~~ some operating information. Curt went along with me on that occasion. -

We got up there, and we found that they needed some new parts. They ^{had} ~~damaged~~ some parts. So we got in the plane, flew back to Boise and ^{picked up} ~~got~~ the parts that we needed, back [chuckling] to Kellogg from Boise and got it fixed up and running again. Well, that was quite a bit of doing, so Curt, part of the time, he flew while I took a nap {chuckling}.
(11 - 20 Summer 1951)

Swent: How old was he at that time?

Clarkson: Well, let's see, 1951. He was, I guess, about thirteen. He was getting to be a pretty good teenager at that point.

Swent: How far away was Bunker Hill?

Clarkson: From Boise in ^{flight - 6.5 hours} ~~the~~ plane we had close to a two-hour flight. - a long day

Swent: Quite a ways.

Clarkson: And Phelps-Dodge.

Swent: That's Magma.

Clarkson: Yes.

Swent: I think the one in Utah is Magma. Is it? I don't know. We'll have to look that one up [chuckling]. At any rate--

(Bob: We must straighten this out.)

Clarkson: I'll have to refresh my memory.

Swent: Yes, they had similar problems, but you decided against the rail.

Clarkson: Garfield Smelter. I think it was the Magma Mill.

Swent: You may be right. You probably are, Bob. I'm sure you are.

Clarkson: Then Utah Copper, the big pit, where the ore was coming from.

Swent: Yes, okay. No, I think you're right.

Clarkson: I get corrected on things.

Swent: Well, I'm sure you're right.

Clarkson: The old memory gets stale. (Chuck - sure - le!)

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Resume of Professional Career

J. R. Clarkson

Period	Company & Location	Job/Position
1930-1931	Belshazzar Mine Placerville Boise County, ID <i>Gravity concentrator - Gold</i>	Mucker/Trammer Mill helper
1931-1935	Bradley Mining Co., Meadow Creek Mine Stibnite Idaho <i>Gold, silver, antimony</i>	Mill Shift Boss/Operator
1935-1937	Idaho Maryland Mines Corp. Grass Valley, CA <i>Sand/Slime leach pilot plant Gold</i>	Test Operator & Assayer
1937-1938	Pardners Corporation Buckhorn Mine Eureka County Buckhorn, NV <i>Flotation/Gravity concentrator Gold</i>	Mill Superintendent
1938-1940	Indian Valley Mining Company Standart Mine Plumas County Greenville, CA <i>Flotation/Gravity concentrator Gold</i>	Construction and Mill Superintendent
1940-1941	Hoefling Brothers Surcease Mine Oroville, CA <i>Cyanide mill addition Gold</i>	Project Supervisor Construction
	Fresno Banner Mining Co. O'Neals, CA <i>Construction - Flotation/Gravity Concentrator Gold</i>	Project Supervisor Construction

Period	Company & Location	Job/Position
1941-1942	Calistoga Mining and Development Company Grand Reef Mine Klondyke, AZ <i>Mine/Mill rehabilitation</i> <i>Silver, lead, zinc</i>	Resident Manager
1942-1951	Bradley Mining Company Yellow Pine Mine Stibnite, ID and Ima Mine Patterson, ID <i>Crushing plant mill and smelter</i> <i>Tungsten, antimony, gold</i>	Mechanical and Construction Superintendent, also Acting Mill Superintendent, Company Pilot
1950-1959	The Clarkson Company and Equipment Engineers A Partnership San Francisco & Palo Alto, CA	Partner and Vice President of Production and Product Development
1959-1979	The J.R. Clarkson Company a Corp. dba The Clarkson Company Palo Alto, CA	President
1979-present	In 1986 The Clarkson Company became a Nevada Corporation.	Chairman of the Board
Honors:	1982 - Honored as a distinguished member of the SME of AIME 1995 - Legion of Honor - 50 year member of SME of AIME	

J. Robert Clarkson

Community Activities

Chairman	Village Board, Stibnite, Idaho - 1948 - 1950
Member	Stibnite, Idaho School Board - 1946 - 1948
Member	Valley County, Idaho, Board of Education during national school reorganization - 1948 - 1951
Member	Palo Alto, California Lions Club - 1963 - 1986
Director	Palo Alto, California Lions Club - 1973 - 1983
Member	Palo Alto, California Chamber of Commerce - 1953 - 1985
Director	Palo Alto, California Chamber of Commerce - July 1975 (3 year term)
Member	Masonic order, A.F. & A.M. - 1945 - life
Member	Scottish Rite of Free Masonry, SJ, 32° - 1946 - life
Member	Shriners, A.A.O. N.M.S., (Shriners Hospitals) 1947 - present

Professional Organizations

Society of Mining Engineers of the American Institute of Mining & Metallurgical Engineers (SME of AIME)	Member 1945
Canadian Institute of Mining & Metallurgy (CIM)	Member 1973
Aircraft Owner & Pilots Association (AOPA)	1948
Instrumental in establishing and bringing additional funds into the Idaho Mining Memorial Scholarship Fund, University of Idaho, College of Mines and Earth Resources.	
Listed on page 122, <u>Who's Who in the West</u> , 14th edition - 1974 - 1975	

October 9, 1997

Highlights of J.R. (Bob) Clarkson's Career

There are many wonderful rewards from following a professional career in the mining industry for an individual who has and exercises knowledge, talent, determination and strong character. The opportunities can be unique because mines are located at the source of the raw material and that is most often in remote areas. As the son of J.R. (Bob) Clarkson I offer the following review of Dad's career as a testament to his character relative to his skill and talent, employers, subordinates and family.

1930 - 1931

Dad married Edna Mae Evans August 5, 1930 and the opportunity for a first time mine job came at the Belshazzar Mine in the Boise Basin district of Idaho. Dad's first job was underground miner's helper later advancing to mill worker.

1931 - 1935

The Belshazzar ceased operation when the paying grade of ore ran out during the worst time of the depression years. A lucky break was Dad's, however, when he was the last worker hired in 1931 at Bradley Mining Company's Meadow Creek Mine in remote central Idaho. He became a mill operator and an on the job student in a new mill built to recover and separate the gold and antimony values from stibnite, a complex sulfide ore. On stream flotation, still in a pioneering stage of development, separated the two value bearing minerals into concentrates. The gold concentrate continued through a roasting and cyanide section for final recovery and the antimony concentrate had to be stored through a long winter season and then shipped to distant smelters.

New technology for mineral processing was developing and many young engineers were intrigued by the metallurgical challenges that were presented by the many complex ores found in the western states. Dad's interest, though, was mechanical - when the metallurgy was figured out in labs and pilot plants the question became what was optimum design and layout of equipment for maximum return on the company's investment? This interest led him to a career which included key management positions in mill construction and operation, a number of U.S. and foreign patents and ultimately his own thriving manufacturing business.

Space does not permit recounting the challenges of keeping a wife in remote mining camps in those pre World War II years, suffice it to say one was fortunate if the company provided a stack of lumber and tent canvas. Dad and Mom were very

resourceful with what was provided along with some scavenging, but the beginning was what set the stage for the successes that followed.

1935 - 1942

During this period Bob Clarkson's career opportunities took him to California, Nevada and Arizona before returning to Idaho. He held his first management positions and some of his mechanical creations began to take shape. His most noted early mechanical development was the Clarkson reagent feeder for accurately feeding flotation reagents. To date, over 40,000 Clarkson feeders have been sold around the world and they continue to be the feeder of preference in many flotation mills.

His attached resume recounts positions held. I have to say that his success in construction and operations management was a combination of a thorough understanding of equipment, good practical engineering skills and a tremendous respect for skilled workmen. His first mill superintendents job at the Buckhorn Mine in Nevada was the result of Otto Brown, an American Cyanamid Metallurgist, saying when visiting the mine "I know one person who can straighten this mill out." The mill got straightened out but treatable ore did not last.

1942 - 1951

In 1942 Bob and Edna Clarkson now with two children moved back to Stibnite, Idaho which had become a critical operation in the war effort. Further expansion and modernization was necessary to meet the demand for antimony and the more recently discovered tungsten in the Stibnite ore body.

Being in charge of construction at the growing stibnite mine included construction of plant facilities as well as employees' residences and recreation facilities. Dad's primary focus, though, was to adapt the existing mill/concentrator for the added recovery of scheelite (tungsten).

Two major projects brought further industry recognition to Dad - design and construction of a pit side crushing plant located 2 miles from the mill and the installation and start up of a 9-1/2' x 12' rod mill as tertiary crushing stage at the mill site. The crusher was unique in its location but also in design. Primary crushed ore was transferred up to the secondary crusher and storage bins on high speed conveyor belts inclined on 18° slopes. The belts ran 370 fpm moving 300 TPH. Unique time delays were used in emergency shut-downs to prevent ore from piling up at transfer points and still allow crushers to crush out.

The rod mill was one of the largest installed in the 1940's and many problems (opportunities) were encountered. Probably the greatest was liner design. Conventional wave liner designs were a failure, therefore, a new liner lifter design was developed under Dad's direct supervision. The design was successful and also used in an identical rod mill that was in operation at the Anaconda Mill in Montana. Dad gave a

paper on this development at the 1950 Metal Mining convention and Exposition in Salt Lake City. This development was also reported in an article about Stibnite in the December 1947 issue of World Mining.

Also during this period Dad did test work on closed circuit grinding using hydrocyclones to classify the ore. He also served as company pilot for Bradley Mining Company flying a North American Navion.

1950 - 1959

The Clarkson Company was founded in 1950 as a partnership by Bob Clarkson and Kellogg Krebs to manufacture the Clarkson feeder. For the previous 14 years it had been manufactured under license by American Cyanimide Company. Dad continued in his position with Bradley, however, until October, 1951, while establishing Clarkson manufacturing in Boise. In September, 1952, The Clarkson Company and Clarkson family moved to Palo Alto, California.

During the 1950's additional products were developed including the Krebs hydrocyclone and the first Clarkson slurry valves. The basic cyclone design was obtained from a third party, however, many of the refinements were a result of the test work Dad did at Stibnite during the late 1940's. The result was a revolutionary change in closing primary grinding circuits.

Clarkson and Krebs separated in 1959 and The Clarkson Company under Dad's leadership pursued further slurry valve developments. Today Clarkson is recognized as a leading slurry valve manufacturer. 40 percent of Clarkson's sales are exported throughout the world. At 87 years old Dad continues to serve as Chairman of the Board.

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BOTH HAVE RECORDS OF ENDURANCE



PAGE 2 —
STANDARD

GREEN
CALIF.

Colorado Forged Steel Grinding Balls

PHIL BURCH* reports

Consistent Progress Made by Standart Mine

THE Standart mine, one mile south of Greenville, Plumas County, California, has established itself as one of Northern California's out-



G. L. Johnson

standing lode properties as a result of the consistent development and construction program conducted during the last six years. The mine was acquired in March of 1934 by its present operators, the Indian Valley Mining Company, and development work was started immediately under the direction of C. L. Hibbard of

Seattle, Washington, president, and G. L. Johnson, resident manager.

The property consists of 11 lode claims (three of which are patented) and one placer claim. Locations on the two veins, the Southern Eureka and the Indian Valley, were made separately. The Atlantic and Pacific claims were located on the Southern Eureka vein by J. McKinney in 1874. In 1885 this property was purchased by George Standart whose son, F. J. Standart, in 1906 acquired the Hibernia claim on the Indian Valley vein and consolidated the two, forming the Standart mine. These properties, during intermittent operations prior to 1930, are credited with a production of about \$600,000.

The Indian Valley and Southern Eureka veins parallel each other, striking southeasterly and dipping nearly vertically. They occur in granodiorite. The vein filling in the Indian Valley is an extremely hard, silicified dike material containing free gold and pyrite with minor amounts of other sulphides. The Southern Eureka vein is of a highly oxidized nature and quite soft, the values occurring as relatively coarse, free gold. Both veins vary in width from 10 to 15 feet.

One of the first pieces of development work was the crosscut tunnel, referred to as No. 2, driven to intersect the veins at an elevation which gave 600 to 800 feet of new backs. The tunnel was completed in the spring of 1935, cutting the Indian Valley and Southern Eureka, respectively, at distances of 1,100 and 1,700 feet from the portal. A smaller vein, known as the Little Hi-grade, was intersected 900 feet from the portal.

During the following three years, about 7,000 tons of development ore from the three veins were treated by amalgamation in a 10-stamp mill already on the prop-

erty. Within the last year, the Standart mine of the Indian Valley Mining Company, has entered the list of regular producers and made a place for itself as one of the out-standing lode properties in Northern California.

Ore was delivered to the mill from the portal of No. 2 tunnel over a 700-foot aerial tram line. By December of 1937 sufficient ore was developed to justify the construction of a new mill. To facilitate delivery of ore to the mill site, and to obtain additional backs, a new 2,400-foot crosscut, or main haulage level, was driven 365 feet below No. 2 tunnel. The crosscut was completed in the fall of 1938, work advancing at the rate of 300 feet a month. Shortly afterward, a 125-ton mill was completed and production started, only to be halted five months later when the mill was destroyed by fire. A new mill was completed in August of 1939 and mining again resumed. Since that time production has been maintained at the rate of 5,000 to 6,000 tons a month.

MINING on the Indian Valley vein is by conventional shrinkage stoping; but the method now employed on the Southern Eureka is unique for this type of an operation and is accomplished at a cost comparable to large-scale, open-pit mining.

A shrinkage stope was started originally, but the ground became extremely heavy and at 150 feet above the drift level was impossible to hold. At first it appeared that the stope would have to be abandoned,

since the ore already broken could not be made to run in the chutes. Finally, however, the management decided to try removing a set of lagging in the drift. This procedure solved the problem by permitting the ore to run into the drift where it is loaded with mucking machines.

When the ore stops running at one opening, the hole is timbered over and movement is made forward or backward along the vein from another opening. There are 700 to 900 feet of backs on this ore shoot, and the whole ore shoot appears to be moving. The material is of such a nature that it will run on about a 45-degree angle, which means that a considerable percentage must be drawn from the vein area outside the ore shoot. However, none of the vein area is completely barren and due to the cheap mining cost quite low-grade ore can be handled economically. Three men—a miner, a trammer, and a man on the mechanical loader—can in one eight-hour shift deliver to the coarse-ore bin 72 cars or about 90 tons.

Ore is delivered to the 250-ton coarse-ore bin by storage battery locomotive in 12-car trains of Miners Foundry side-dump cars of 1½-ton capacity. Other equipment includes two Model 12 Eimco-Finlay loaders; two 375-c.f.m. Gardner-Denver vertical-type compressors; a Gardner Denver steel sharpener and furnace; and Chicago Pneumatic stopers and drifters. Compressors and mechanical equipment are electrically driven through V-belt drives.

Outside structures connected with the mine are grouped around the portal of the main haulage level. Included are the blacksmith shop, also housing the compressors;



General view of the Standart mill of the Indian Valley Mining Company

*Seneca, California. Photographs by the author.

timber framing shed; and a modern change room. The tramway to the mill and all outside track are covered with snow shed.

THE present milling plant is a 250-ton jig-amalgamation-flotation plant, located in an all-steel building of conventional design. Mill buildings were designed to provide ample room for the addition of machinery capable of bringing the daily capacity of the plant up to 500 tons. Construction of the unit was contracted to the Miners Foundry of Nevada City, California. The award also included the manufacture and installation of 15,000 feet of six and eight-inch water-main pipe. Water is supplied from Lake Bidwell at a maximum of 400 gallons per minute. Construction was completed in 3½ months, under the supervision of J. R. Clarkson, mill superintendent.

A good many improvements and refinements in plant design were worked out by

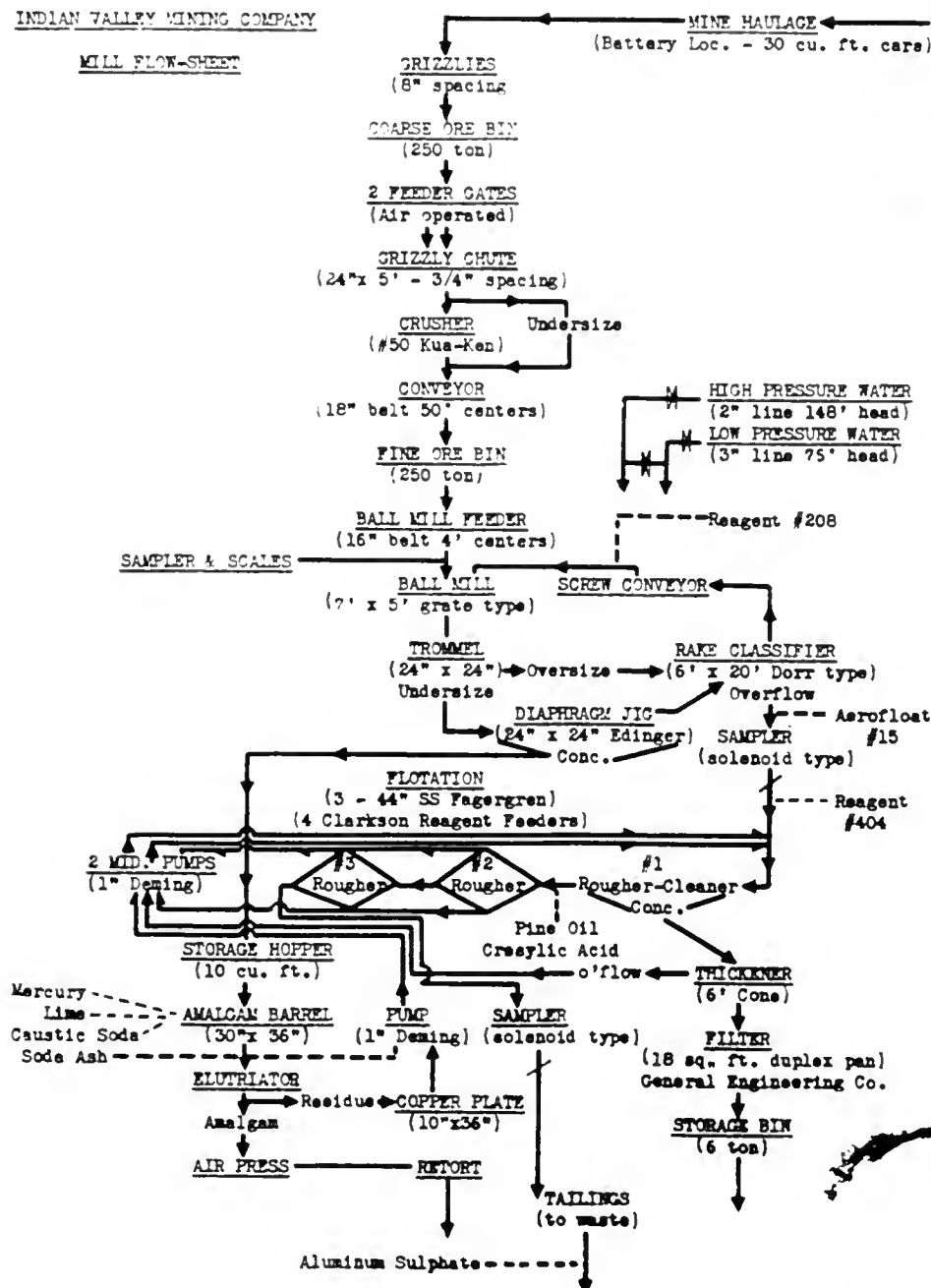
the contracting company and the mine staff, all based upon a careful study of the operating record of the former mill. The result has been that the present unit is outstanding in reduction efficiency and low operating and maintenance costs.

All possible wear points have been designed for repair or replacement in a minimum of shutdown time—dual pumps were installed for the flotation middling return, affording a stand-by unit ready for operation at any time, etc. Incidentally, these pumps deserve special mention. They are designed especially for sand pump use and require only a one-quarter or one-third horsepower direct-coupled motor; and to replace the entire pump mechanism costs but \$20. Instead of the usual repairing when parts are worn out, the pump is discarded and a new unit set in place.

The mill units which require constant operator attention are grouped on one

INDIAN VALLEY MINING COMPANY

MILL FLOW-SHEET



J. R. Clarkson, mill superintendent of the Indian Valley Mining Company. He is the inventor of the Clarkson reagent feeder used in company's Standard mill.

floor level—mill feeder, grinding circuit, jig, main switch panel, flotation, etc. Gravity flow is maintained to a maximum with such equipment as the thickener, filter, and amalgamation barrel, all of which are located on the lower floor. Clean-up facilities, storage, heating stove, and fuel supply also are on the lower floor.

For crushing, a Kua-Ken advanced crusher (Straub Manufacturing Company) is used to reduce the mine run product to one-inch maximum size for ball mill feed. In the grinding circuit, a 6 by 5-foot grate discharge mill and a 6 by 20-foot classifier, a very high circulating load is maintained, resulting in high grinding capacity and contributing to long line life with minimum ball consumption. A 24 by 24-inch Edinger jig receives the ball mill discharge, an integral mill trommel by-passing oversize material direct to the classifier. This is a constant discharge type jig, the concentrates from which flow to a hopper over the amalgam barrel.

The classifier overflow, maintained at minus 65 mesh and an average of 26 percent solids, together with the amalgam barrel residue, provides the flotation feed. (The amalgam barrel is run only in batch lots every other day.) Three 44-inch Fagergren (American Cyanamid Company) Standard square flotation machines are used. Reagent control is by four Clarkson (American Cyanamid Company) reagent feeders. The first cell is used as a rougher-type cleaner with one-side delivery of concentrates and the following cells are used as straight roughers delivering from both sides. The flotation concentration ratio averages 1,200 to 1 on the oxidized

ore and 800 to 1 on the sulphide ore, with averages running in between on various mixtures of the mine run.

Concentrates are thickened in a 6-foot 60-degree cone with the overflow returning to the middling pump sump and the discharge passing directly on to the filter pans. The filter is an 18 square foot duplex pan type (General Engineering Company) which is ideal for small tonnages. As the moisture content is easily controllable, very little operator time is required and maintenance is practically nil. After filtering, the concentrates are shipped in bulk via company trucks to the American Smelting and Refining Company at Selby, California. Mill balls and other mine supplies are hauled on the return trip.

After the jig concentrate is amalgamated, the residue is returned to the flotation circuit for further concentration. This procedure eliminates further handling of a product much too low in grade for smelter treatment without creating any objectionable condition in the flotation circuit. In amalgamating the jig concentrate, a 500 to 600 pound batch is ground for 20 hours, then mercury with reagents is added and the pulp diluted. After grinding for three more hours the barrel is dumped while running, discharging through a $\frac{3}{4}$ -inch pipe bushing spigot. An elutriator is used to recover the amalgam, followed by a series of copper plates for picking up occasional beads of mercury carried out of the elutriator. When the barrel is charged with mercury, warm water also is added in sufficient quantity to maintain a temperature neutral to the flouing condition of mercury. The mercury loss is very low per ounce of gold recovered. Retorting and further handling are carried out in the usual way.

THE plant has not operated long enough to give complete operating cost details; however, the following items may be listed:

Flotation reagents and amounts consumed per ton of ore treated:

	Pounds
Pine Oil	0.017
Cresylic Acid	0.02
Aerofloat No. 15	0.041
Reagent No. 208	0.07
Reagent No. 404	0.023

	Per Ton of Ore
Flotation reagent cost	\$0.035
Other reagent	0.005

Total\$0.04
Alloy steel balls, 4-inch: 1.9 pounds
Recovery:

	Per Cent
By amalgamation	60 to 68
By flotation	34 to 26

Total93 to 95

The following crew is required:

Crusher man
Three operators
Helper, tailings dams and mill roustabout
Assayer, also serving as mine engineer



An ore train at the Standart mine. William Cox, mine superintendent, handling the ore; Raymond Robinson on the locomotive.

The assay office is located near the mill on the main level. It is of all-steel construction, partitioned in the following manner: bucking room, fluxing and furnace room, chemical room, and balance room. The following equipment is used: 4 by 6-inch Wheeling type crusher, Braun pulverizer, Denver Fire Clay Company muffle-type oil furnace, Ainsworth pulp and button balances. A large electric sample drying cabinet is located in the mill.

All mine and mill equipment is electrified, using modern and compact driving units, such as V-belt drives, gear-head motors, etc. The average combined demand is 350-horsepower and consumption averages 98,000 kilowatt hours per month. Power is furnished by the Indian Valley Light and Power Company at an average cost of 1.2 cents per kilowatt.

The present mine staff is composed of G. L. (Gus) Johnson, general manager; J. R. Clarkson, the inventor of the Clarkson reagent feeder, mill superintendent; Gail Dyer, assayer and engineer; and William Cox, general superintendent.

GRAND REEF MINEProject proposal
with budgetNew Shaft

May 1942

Specifications: Two compartments 4' x 5' timbered with 8" x 8" Oregon fir, concreted collar, and equipt with 30' steel headframe and integral 6' x 18' cylindrical bin. Station at 100 level will include 30' shaft below the level for sump and 12 ton capacity ore pocket.

Hoisting equipment: Present underground hoist will be electrified with 62 H.P. motor on hand and the cage will be equipt with a new 24 cu. foot skip. Shieve, bearings, and cable all on hand.

Material, supplies.

Labor, etc.:	12000 bd. ft.	8" x 8" - 14' & 16'	@ \$60/M	\$ 720.00
	7000 "	2" x 12" - 16' & ladder stock		450.00
	Hanger Rods, 5/8" threaded, 420 lbs.	@ 8¢/lb.		38.00
	Powder, fuse, and caps			290.00
	Drill bits and steel			250.00
	Labor and supervision			<u>2200.00</u>
	Cost			\$ 3948.00

Equipment:

Material, concreting collar and headframe construction.	700.00
Electrifying hoist, foundation and bldg.	500.00
1 heavy jackhammer	200.00
Air compressor, power, and fuel.	550.00
Miscellaneous	<u>102.00</u>
Cost	\$ 2052.00

Connecting drift:
(100 level)

140' drift @ \$11.00/ft.	<u>1540.00</u>
--------------------------	----------------

Total cost	\$ 7540.00
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AMERICAN CYANAMID & CHEMICAL CORPORATION

AZUSA, CALIF.



TEL AZUSA 39411

1000-27th Street
Sacramento, California
July 25, 1942.

Mr. J. R. Clarkson
Calistoga Mining & Development Co.
Clondy Re, Graham Co., Arizona.

Dear Bob:-

Thank you very much for your letter of July 17. I had been looking forward to hearing from you and to knowing whether or not you decide to leave Arizona and take the Yellow Pine job. Yellow Pine is the mine that gains by your decision and I was glad to know that you had taken John Bradley's offer and believe it was a wise move. I know of no other mine in the country that is more important from the war effort than the one at Stibnite and there is certainly work to be done in that mill.

I do want to see you when you go through Northern California. I'll be either in Sacramento or Grass Valley for the next week and if you go through during that time we can contact either here or in Brown's Valley. If this letter reaches you before you leave Clondy, will you drop me a line the day you leave there so that I can judge the approximate day you will reach Northern California and I will then be certain to be in Sacramento the day you get here.

I have some suggestions to make concerning the Stibnite job and have been holding them until I heard from you and knew whether or not you would be going up there. Yes, I enjoyed my stay at Stibnite very much. There are certainly any number of very interesting problems connected with the beneficiation and marketing of the minerals and metals in that ore. You will no doubt find that your varied experience will come in quite handy before you get that mill running like an eight day clock and have it so that you could eat off the floor-I'm thinking of the Standard Mill at Greenville now.

Should I not be in Sacramento the day you go through, Beatrice will telephone me when you stop here and I will drive to Brown's Valley from wherever I may be.

Sincerely,

D. R. Brown

MINING WORLD

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J R CLARKSON
STILLMAN
OHIO
101356



ONE OF SIX SIZES

PAGE 16 - STONITE
Tough, rugged PACIFIC JAW CRUSHERS
are doing an outstanding job in hundreds
of mines throughout the world. As with
all PACIFIC PRODUCTS, they deliver effi-
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severe usage. There's a size for every job.

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★ Other PACIFIC PRODUCTS include: ★
e Sheave Blocks • Rock Bit Grinders • Slushing Scrapers
Mill Liners • Manganese Steel • Manganese Steel
Sprocket and Idler Wheel Rims • Renewable Tractor
Crusher Jaws • Crawler Shoes • Manganese Steel
Other Wearing Parts

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General view of the Yellow Pine pit giving clear view of mining system, receiving hopper of the primary crusher, two-stage conveyor and fine ore bin.

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October 1947

BRADLEY'S YELLOW PINE MINE

*Producer of Vital Tungsten and Antimony During the War,
Now Tuned Up to Produce 6,000 Tons of Antimony Yearly*

Operation of the Bradley Mining Co.'s Yellow Pine mine at Stubnite, Idaho, has for some time interested and fascinated the mining industry. This is true partially because it is a most unusual ore body, but mostly because it has twice been able to step into the breach to avert a crisis when the nation faced a critical shortage of a minor metal.

During the war, when the need for tungsten and antimony was critical, Yellow Pine accounted for about 40 per cent of the domestic production of tungsten and 90 per cent of the antimony. This was about 19 per cent of the total tungsten requirement and about 12 per cent of the antimony demand. As the war ended, the fabulous scheelite ore body was exhausted and attention was shifted to antimony. Current output accounts for about 97 per cent of all domestic production and about 40 per cent of the primary metal (imports plus domestic production) needed to meet

to continue, with output running roughly 6,000 tons of antimony metal annually.



Jack Bradley

Vice-president in charge of Idaho

In addition to this, however, the operation presents many geological, technical, and metallurgical points of interest. The moderately large, low-grade orebody is different from any other deposit known. Crushing is handled in the pit, conveyors are used to transport the ore, and milling methods are unlike those at any other place in the western hemisphere and are comparable to methods in use in only four places in the world. The Bradley Yellow Pine operation is worthy of study by mining people everywhere.

Because of the extent of the operation, this article will deal only with a description of the ore body and mining and crushing methods. The antimony-gold metallurgy and the operation of the Village of Stubnite and the Company's employee relations program will be discussed in subsequent issues of MINING WORLD.

The Antimony Industry

Contrary to some reports, the

United States does have a substantial antimony producing industry. It also has a consumption which exceeded supplies, both domestic and imported, by nearly 8,000 tons in 1946. The remainder was withdrawn from the Metals Reserve stockpile which at the beginning of the year had dwindled to 4,632 tons of contained metal.

Antimony producers have resented a rash of propaganda purporting to show that the domestic industry is unimportant. Some allege the purpose of the campaign is to aid in rehabilitating the Chinese industry. Others attribute it to the "import everything" thinking in some government quarters. Whatever the reason, the producers defend their position by pointing out that, in 1946, total consumption of primary antimony was 17,527 short tons and 19,851 short tons of secondary. About 8,500 tons was imported from five nations. Another 8,000 tons came from the stockpile and the remainder was obtained from domestic sources, mostly scrap, it is true.

Now with the Yellow Pine mine in full scale production at an estimated 6,000 tons per year (it produced little in 1946) and metal from secondary sources continuing about the same, the domestic industry is an important factor in the economy. It is further pointed out that this production can be maintained for possibly another five years without the development of another pound of antimony ore reserves, an unlikely situation.

At one time China was the dominant source of imported antimony. However, the industry was completely disrupted and accounted for only 1,700 tons last year. Even this was a full three times as much as the 1945 figure. Bolivia then became the leading exporter to the United States:



Left to right: H. D. Bailey, manager of the Yellow Pine property; Thomas E. Fleming, assistant manager, who has active direction of operation of the pit, and Edwin D. Adams, assistant mine superintendent, who makes his rounds of the pit with an old Army reconnaissance car.

but Bolivian production has slumped; and most of its current output is going to supply the European market which was dormant during the war years. Mexico now leads in exports to the United States followed by Bolivia, China, Japan, Siam, and Honduras.

Antimony the Metal

Antimony was one of the earliest known metals because of its simple metallurgy and wide distribution. In 1540 an Italian writer described it as "a mineral deformity and a monstrosity among metals; or," he said, "it might be a material that is about to reach metallic perfection, but is hindered from doing so by being mined too soon." Antimony compounds possess certain medical properties which were much used during the Middle Ages. Compared with other metals, little progress has been made in the metallurgy and utilization of antimony since those times. Metallurgical research comparable with that given other metals no doubt could greatly expand its industrial usefulness.

The principal uses today are in antimonial lead for the manufacture of storage batteries, castings, cable

covering, etc.; and for other alloys such as bearings, type metal, and solder. It is used also in ceramics, paints, glass, rubber, etc. A new use that promises to consume important quantities is in flame-proofing fabrics such as draperies and curtains in theaters, night clubs, and public buildings.

Most secondary antimony is suitable for the manufacture of antimonial lead, and the 1947 pinch in this field is not too tight. However, uses requiring primary antimony appear somewhat greater than they were the previous year and result in a short supply of this metal. Consuming industries are making every effort to conserve the supply and to use antimony from secondary sources wherever possible.

Geologically Unusual

Because it is somewhat different from most deposits, a review of the Yellow Pine geology brings out several characteristics which might have been overlooked in the past and hence be helpful to prospect other Idaho districts or elsewhere. The country rock is a quartz monzonite of the Idaho batholith. Dikes and

Cut at left shows vertical holes used for primary ore breaking. The churn drills are two Bucyrus-Erie Model 22T's powered by Waukesha gasoline engines. Six-inch holes are drilled four to five feet below grade. Noteworthy is the rather precipitous set-ups of these two machines. At right, short benches are drilled with two or three rows of 24-ft. horizontal holes spaced at six-foot intervals. A similar pattern is often used in combination with vertical churn drill holes in very hard ground. Here Joe Durham and Jack Gott put in a round with an Ingersoll-Rand EM-2 wagon drill and X-71 drifter. The drill is equipped with 1½" round steel and Timken bits.





Left to right: L. C. Clark, chief engineer; Ernest E. Coleman, electrical and equipment superintendent. His biggest job is to keep the fleet of trucks running. Roy R. Godlove, assistant electrical and equipment superintendent, uses a yellow jeep to handle his job; John R. Clarkson, construction superintendent, and the company Navion, four-place airplane. A pilot, Clarkson does part of the flying for the concern. Hamer J. Shaw, chief clerk.

irregular bodies of aplite and pegmatite are abundant, particularly in or near the ore zones. The principal structural feature is the Meadow Creek fault which is known to extend for over four miles and is over 100' in width in places. Lamprophyre and dacite dikes usually are found with the ore and probably are related to it.

The combination of minerals found at Yellow Pine is unusual and believed not duplicated in any other known district. It is apparently due to superimposed mineralizing periods. Pyrite and arsenopyrite with gold, which form a low-grade deposit, were widely disseminated in quartz monzonite through selective replacement with much of the original texture and appearance being retained. This low-grade ore may be considered the basic type with stibnite and scheelite usually absent. Brecciation of this ore, in certain areas, was followed by the deposition of scheelite and later by stibnite. The antimony mineral, stibnite, carries silver and is usually present as veinlets or lenses with associated fine-grained quartz. Scheelite was the most limited in extent of the ore minerals

and was confined by certain cross structures and to certain horizons. The scheelite-stibnite ore in the center of the Yellow Pine deposit constituted a most remarkable mineral concentration. A typical assay was 2.5 per cent WO_3 , 3.5 per cent Sb, 1.5 oz. Ag and 0.06 oz. Au. This body has now been exhausted. There are, however, several other fault intersections along the Meadow Creek fault which offer every evidence of producing similar ore bodies to that presently being mined.

All mining today is by open pit methods, and the most desirable extraction rate, considering reserves, milling plant and other facilities, is 2,500 tons, which makes the pit the largest producer of crude ore in the state.

The ultimate size of the pit will be about 1,500 by 2,400' with the long axis striking northeast-southwest. The top bench is at an elevation of 6,390' and the present pit is 452' deep. Known mineralization continues lower. The antimony bearing gold ore is in the northeast end of the deposit and grades into low-grade gold ore at a point somewhat past the center. The now exhausted

scheelite ore was a lense near the center and at the bottom of the present pit.

The Pit Just Grew

When the wartime rush for tungsten developed, it was necessary to start immediately extraction of that type of ore. Some was drawn from underground while the pit was hastily opened to reveal the upper surface of the body. When the tungsten ore was exhausted, it was intended to commence gold production and development of the end of the pit, which was made up primarily of gold ore, was started. Instead, an abrupt change in the market and the world supply situation made exploitation of the antimony desirable. The southern portion of the pit had to be developed rapidly in order to reach capacity production in a short period of time.

Most of the ore body will be worked down in 40' benches with an occasional high bench (80') near the ultimate pit limits, and a few lower benches where the ore is thin. Trucking to the crusher will be over reasonable grades when the road system is revamped. Some grades are extremely steep at the present time.



Left: Ore has a tendency to break in rather large blocks and considerable secondary breaking is necessary. Arthur Shipp uses an Ingersoll-Rand S-49 Jackhammer to block-hole a boulder before it is loaded. Right: A 1½-yd. Lima shovel is used to load this 14-ton Sterling truck. The truck is powered with a 150-hp. Cummins diesel engine and has a Hoft-built dump body. The shovel is Waukesha engine-powered. The huge blocks in the foreground will have to be block-holed to permit easy handling.



and the condition is reflected in higher than necessary maintenance costs.

Stripping is well in advance of mining, and the ultimate ratio will be 1½ tons of waste stripped to each ton of ore mined.

Water was a major problem during early operation. The East Fork of the South Fork of the Salmon River, a substantial stream of water, flowed over the ore body, and for a time this was diverted along one side of the workings. A permanent solution was reached in 1943 when a 6 by 9' diversion tunnel was driven 3,500' to carry the river through a range of hills and into the valley on the other side. A crosscut was run from the pit to the tunnel, and surface run-off water is pumped through this to the river. This tunnel was named the Bailey Tunnel.

Ore Breaking and Hauling

Three different drilling patterns are in common use. Most bench material is broken by drilling vertical churn



A fourteen-yard Euclid truck discharges ore into the receiving hopper at the primary crusher. The truck is powered by a 150-hp. Cummins diesel engine.

drill holes. In extra hard material the vertical drilling is augmented by one or two rows of horizontal lifter holes punched in along the bottom to give better fragmentation. Short benches are sometimes drilled with horizontal holes only. All of the methods result in a rather high percentage of the material breaking into large slabs and blocks so that considerable secondary breaking is necessary.

In the areas that are churn-drilled only, 6" holes are put down to 4 or 5' below grade with Bucyrus-Erie 22-T churn drills powered by Waukesha gasoline engines. Four drills are in use. The toe of the bench is held to about 20', and holes are spaced at 10 to 12' intervals.

Holes are loaded with 5 by 16" sticks of Du Pont 60 per cent special gelatin powder. Du Pont Red Cross bag



Looking south across the antimony-gold section of the pit. The primary crusher and receiving hopper is near the bottom-center of the pit, four benches above is the secondary crusher house, and the large building at the upper left is the 900-ton fine ore storage and truck loading bin.

powder is sometimes used in dry holes. Tonnage to be broken is calculated before the holes are loaded, and 4 lbs. of powder per ton of ore is allowed. From the total amount of powder a percentage is deducted to handle necessary secondary breaking so that the over-all powder consumption is 4 lbs. per ton. Holes are loaded heavily in the toe and with a very small deck charge. Mill tailings usually are used for stemming, but occasionally water is used with satisfactory results. The round is shot with Prima-Cord and a single instant electric blasting cap.

Where horizontal lifters are used in combination with vertical holes, Ingersoll-Rand FM-2 wagon drills with X-71 drifters are employed to put in one or two rows of 18 to 22' holes spaced at 6' intervals with 6' between rows. These holes are loaded with 1¾ by 12" Du Pont 45 per cent Gelex No. 2 and are fired with Prima-Cord at the same time the vertical holes are shot. The combination of holes is loaded so as to obtain the same 4 to 1 powder factor.

On the short benches where hori-

zontal holes only are used, they are drilled, loaded, and fired in the same manner as the lifters described above, the only difference being that with 24' holes are commonly drilled.

Boulders are broken by block holing with Ingersoll-Rand S-49 Jackhammers and shot with 1¼ by 8" sticks of Du Pont 60 per cent special gelatin powder. Timken detachable bits are used on all percussion drills.

Loading is handled by a 1½-yd. Lima shovel, two Bucyrus Erie 37-B shovels with 1½-yd. dippers and a 54-B unit with a 2½-yd. dipper.

Hauling is in a fleet of five 14-ton (10-yd.) Euclid trucks powered by 150-hp. Cummins diesel engines and four Sterling trucks with 14-ton Heil dump bodies and the same Cummins engines. They operate over grades up to 12 per cent and deliver ore to the receiving hopper of the primary crusher. The waste haul averages three-fourths miles each way.

Crushing

Experience gained during the war and observation of other open-pit

In order to insure a steady flow of material through the crushing plants during lulls in pit production, ore is stock-piled near the receiving hopper of the primary crusher. Here a D-7 Caterpillar tractor with LeTourneau dozer is used to yard the ore into the bin.





Left: Primary crushing to minus 3½" is accomplished in this 36 x 48" Traylor jaw crusher. A 4 x 16' Stephens-Adamson pan feeder delivers ore over a grizzly with 3½" spacing. Right: Tramp iron is removed by this 36" Dings magnet from the belt which carries the primary crusher discharge and the grizzly under size to the secondary crushing plant.

operations developed the idea of locating the crushing plant near the center of the pit area. By incorporating long conveyors to deliver the crushed ore to the top of the pit, heavy road grades were eliminated and more efficient truck units could be used. The object of the installation was to secure two-stage reduction to minus 1½" and the elevation of the ore, road to road, 190'.

Trucks dump directly into a 200-ton receiving hopper at the primary crusher building, and an adjacent yard is used for storing ore to be dozed into the pocket if operation of the loading shovels is halted temporarily. A 4 by 16' Stephens-Adamson pan feeder with variable speed drive delivers ore over a 4 by 9' grizzly with 4" bars spaced at 3¾" to a 36 by 48" Traylor jaw crusher. The grizzly undersize and the 4" crusher discharge join on the No. 1 conveyor belt. The discharge is completely en-

closed, and dust is exhausted to the outside by a Norblo fan.

This first conveyor, like the one between the secondary crusher and the ore bin on the pit rim, was formerly used for earth moving on the Shasta dam construction project. The belt is 7-ply rubber, 36" wide, and is driven 370 fpm. by a 100-hp. motor. It lifts the ore 175.5' in a slope distance of 583.8'. At the lower end, double protection against tramp iron is provided by a suspended Dings electro-magnet and an induction-electronic iron detector.

Ore is received at the secondary crusher building on a 5 by 10' Ty-Rock double deck vibrating screen. The top deck has 2" square openings and the lower screen, 1". Oversize is crushed to minus 1½" in a Symons 5½' short head cone crusher, and the crusher discharge joins the screen undersize on the No. 2 conveyor. The screen and crusher are not in closed circuit.

The No. 2 conveyor is identical to No. 1, except that it has a shorter inclined section of 430' with a rise of 131'. It discharges into a 900-ton bin by a Stephens-Adamson traveling belt tripper.

The entire installation is well housed and well heated from a central plant. The bin also must be heated in subzero weather to keep the ore from freezing, and even the gates are heated electrically when necessary.

Trucks are loaded quickly through air-operated gates and travel over a high level, three per cent adverse grade to the mill, a distance of 11,000'.

Several types of power units—Euclid, Sterling, and Walters tractors, with 150 to 200-hp. Cummins, General Motors, and Waukesha Hesselman diesel engines—are in use on this haul. All of the bodies, however, are 25-ton, Euclid bottom dump semi-trailers. They discharge into a mill bin 100' long, 26' wide, and 20' deep. The bin has two truck tracks above and a live capacity of 2,000 tons. Five trucks are required for the haul, and one extra tractor is available for stand-by use.

The pit operation, mining, crushing, and hauling, requires about 50 men, including supervisory personnel and 15 men for maintenance. A group of five shops, located near the pit, and a crew of 27 men take care of maintenance for the entire operation.

An interesting point on maintenance is the way that tire costs have declined with the change to postwar tires. Tire costs are still calculated at a flat 30c per mile for trucks in the pit, but it is known that this is down considerably and will soon be adjusted. For road trucks, both ore and concentrate haulage, the rate has been reduced to 11c from the wartime 15c per mile.

The 900-ton fine ore bin is at the pit rim. Crushed ore is conveyed to the top of the bin and dumped by a Stephens-Adamson traveling automatic tripper. A Euclid truck with 25-ton bottom dump semi-trailer may be seen pulling away from the bin for the haul to the mill.



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CLARKSON
BRITE
HO
301 356

YELLOW PINE MINE

PAGE 26

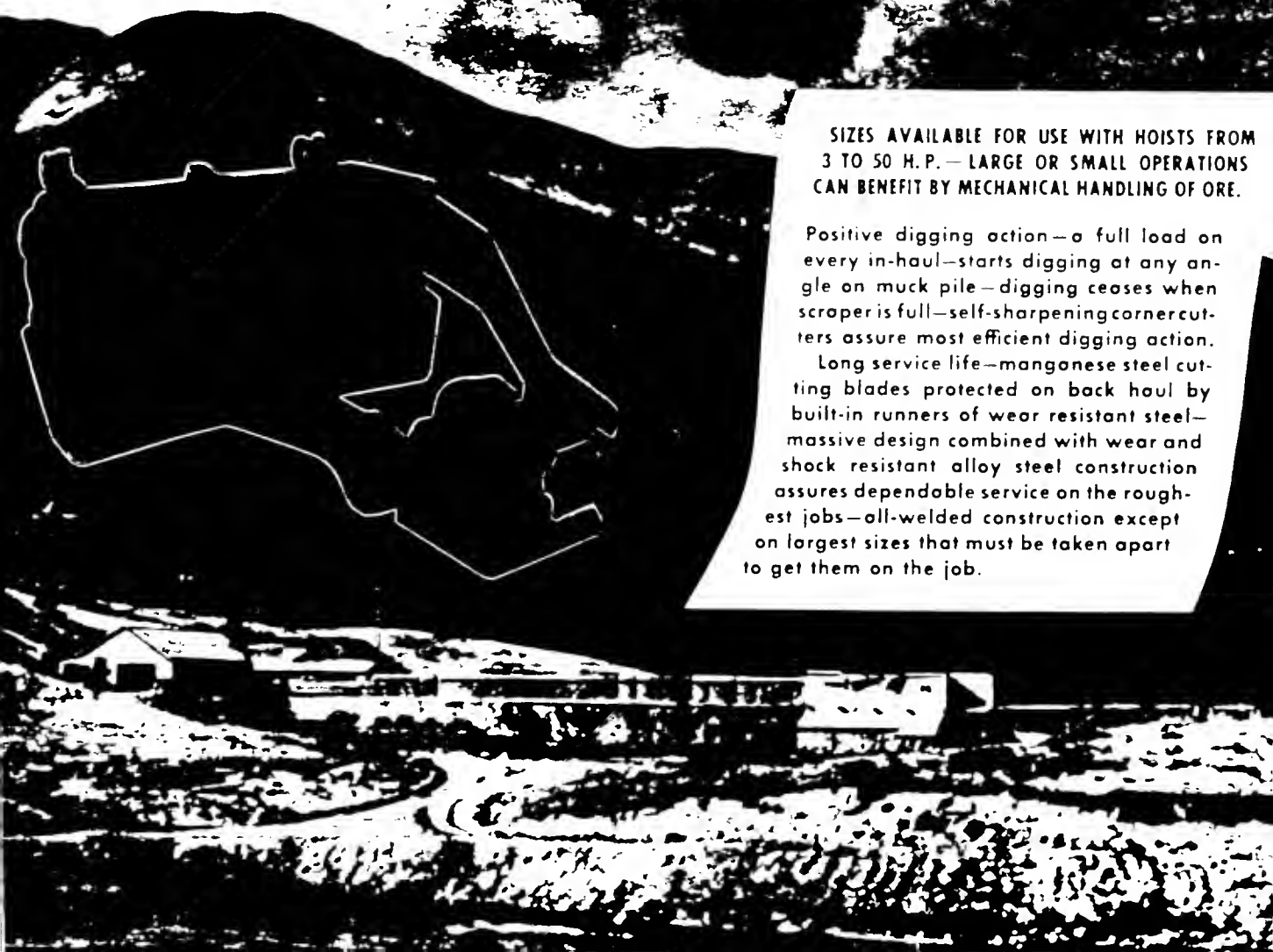
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Long service life—manganese steel cutting blades protected on back haul by built-in runners of wear resistant steel—massive design combined with wear and shock resistant alloy steel construction assures dependable service on the roughest jobs—all-welded construction except on largest sizes that must be taken apart to get them on the job.





Aerial view of the office and mill buildings of the Bradley Mining Company at Stibnite, Idaho. Because it is probably the most remote large-sized mining camp in the United States, 80 miles from the nearest highway, much use is made of the landing strip shown in front of the buildings.

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November 1947

THE YELLOW PINE MILL

Unusual mineralogy and metallurgy combine to make flow-sheet manipulation tricky, but result in substantial recovery

Metallurgy of the antimony-gold ore of the Yellow Pine operation of the Bradley Mining Company at Stibnite, Idaho, is sufficiently tricky and interesting to delight the heart of any metallurgist and to drive the average mill operator to distraction. It is not, as practiced, an ideal metallurgical operation; but is, rather, the usual series of compromises to arrive at the best economic recovery. It is the result of long experimental tests at full mill-scale operation; and by doing things that no one else is doing; by chasing pH's up and down; and by conditioning pulp at the most unusual times and for unusually long periods. A creditable recovery (and money) is made.

The Yellow Pine operation is the only property in the Western Hemisphere recovering stibnite by flotation. In fact, Yellow Pine practice, and modifications of it, are in use in only three other places in the world—Djenli Kaya mine in Turkey, Wiluna Gold mine in Australia, and the Cucuma mine in Czechoslovakia.

The mineralogy of the Yellow Pine

ores is believed to be unique and not duplicated in any other district. Four types are represented, gold ore, antimony-gold ore, tungsten-antimony-gold ore and oxidized gold ore. All require different milling and metallurgical techniques to extract the values. Provision for milling either of the first two types has been made in the present plant. The gold ore, containing little or no antimony, is essentially mineralized quartz monzonite. Pyrite (2-4 per cent) and arsenopyrite (1-2 per cent) have replaced some of the original biolite and feldspar but the original granitic texture is retained. These two previously named sulphides are probably gold bearing, but the exact relationship is not known, as no free gold has been found and cyanide extraction on unoxidized ore is nil. The gold content of the ore ranges between 0.07 and 0.18 oz. and the resultant concentrate 2.0 to 4.0 oz. Sulphide grain size ranges down to 3 microns and averages about 25.

The antimony-gold ore resulted from a later mineralization of part of

the gold ore body by stibnite (Sb_2S_3). This ore varies from 0.5 per cent to 10 per cent antimony with the usual grade about 1.5 per cent and 0.08 oz. gold. Stibnite carries silver with an average ratio of 1 per cent antimony to 0.4 oz. silver.

The principal known tungsten-antimony-gold deposit was mined out during the war years, 1941 to 1945. Tungsten production totaled 831,829 s.t. units of WO_3 . A typical assay for this type of ore was 2.5 per cent WO_3 , 3.5 per cent Sb, 1.5 oz. Ag. and 0.06 oz. Au.

Oxidized gold ore is stockpiled for future treatment. Completely oxidized ore is easily cyanided, but mixed oxide and sulphide presents a problem. Present day gold recovery is often affected by partial oxidation.

Current operations are on the antimony-gold ore with the stress being placed upon recovering critically short antimony. The optimum economic recovery (not maximum metallurgical recovery) is effected by the production of a bulk rougher con-

centrate which is subjected to four stages of cleaning. Antimony mineral is then depressed and the gold floated from it, the remaining material forming the antimony concentrate. The froth, which is the gold concentrate, is cleaned twice and the tailing produces a low grade antimony product.

Topography was a controlling factor in the location of the Yellow Pine mill. The original 150-ton plant on the present site was built in 1931 to treat similar ore from an adjacent underground mine. The Yellow Pine open pit, started in 1938, is two and one-half miles down the canyon from the mill. Consideration for relocating the mill below the mine was eliminated by the absence of tailing storage areas. The present tailings area above the mill has good possibilities for storing over twenty million tons of waste.

Climatic conditions during the winter months are unusually severe. In order to minimize freezing in the bins, every effort must be made to keep snow out of the broken ore and move it to the mill without delay. No ore is left in the crusher bins between shifts, and the mill storage bin is not large. Fine crushing would tend to aggravate freezing and, therefore, two stage, open circuit crushing to minus $1\frac{1}{2}$ " was decided on. Provision has been made to heat both the crusher and mill bins and the chute gates when necessary.

During World War II the production of as much tungsten as possible was the principal consideration. For several years production from the Yellow Pine constituted over half of the total output of this country. Mill tonnage varied between 500 and 800 tons per day, and equipment of various sizes and makes was crowded into the structure. Four flotation concentrates and a gravity concentrate were made during this time. Finally, the tungsten ore was mined out, and in 1946 the mill was completely remodeled, utilizing the old buildings and machinery as far as possible. New crushing and conveying equipment, a few new flotation cells, and a large Marcy rod mill were the principal units added.

The decision was to go to two-stage grinding. This was influenced by the following factors: 1. Crushing to $\frac{1}{2}$ " was inadvisable because of freezing trouble and the presence of clay and gouge. 2. A cost comparison seemed to favor this scheme over three-stage crushing plus single-stage grinding. 3. Addition of more ball mills was difficult from an installation standpoint:

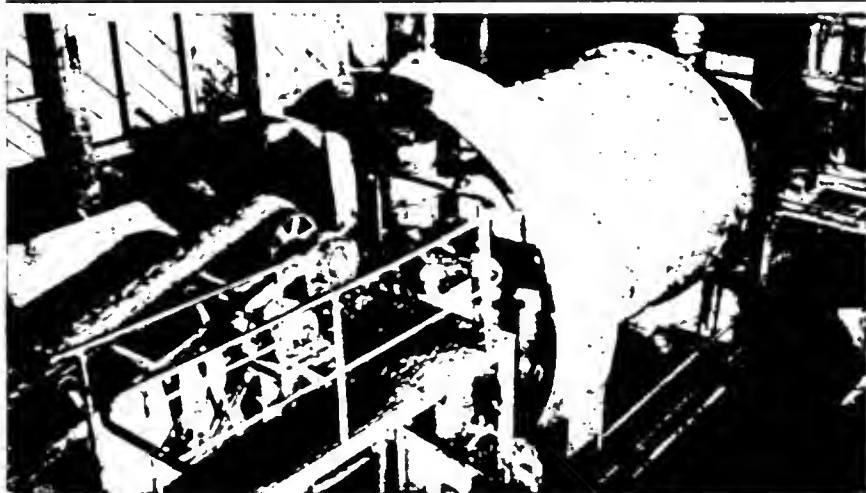
owing to the limitations of the present mill building.

Note: For a more complete description of the Yellow Pine orebody and the operation of the pit see *Mining World* for October, 1947.

Rod Mill Successful

Trucks with 25-ton bottom dump semi-trailer bodies deliver crushed ($1\frac{1}{2}$ ") ore from the pit to a long storage bin of 2,000 tons live capacity at the mill. Feed for the rod mill is drawn onto two parallel 30" belts 120' long that run full length of the fine ore bin. There are 11 feed chutes spaced over each belt. The chutes clear the belts by 30". One horizontal and one vertical rack and pinion gate

closes the feed opening on each chute. Two wheel mounted belt-type feeders on tracks straddle each of the conveyors and can be located under any feed chute. Feed adjustment is made by height of the front gate opening and by a Reeves variable speed drive on the feeder belts. Adjustment on a single feeder ranges from 10 tons to 60 tons per hour. Usually only one feeder on each belt is operating at any time, the spare on each belt being set under a full chute ready to be turned on when the operating feeder pulls dry. The feed from the two belts under the bin is discharged onto a third 24" belt running at right angles and discharging into the mill feed spout after passing over a Toledo



Rod Mill Liner Wear and Cost Reduced

The use of the big ($9\frac{1}{2}$ by 12') Marcy rod mill in the grinding circuit rather than an additional stage of fine crushing has been a marked success at the Yellow Pine operation. The practice was not, however, trouble free in the beginning, and it presented its full share of headaches. Excessive wear after the waves in the liners had worn smooth was one of the major problems. Cause of the condition was obvious when the 55-ton rod charge started slipping on the smoothed surface of the liners but design for preventing this condition presented a serious problem.

The mill, an enlarged version of other Marcy rod mills, is driven by a 450-hp. motor at 16.6 rpm., which does, however, produce a fairly high peripheral speed of approximately 600 bpm. It had, at original equipment, manganese steel liners which had 40 wave or corrugated shaped parallel ribs running lengthwise of the mill.

Some 124,000 tons of ore were ground before the ribs were completely worn away, but the remaining $1\frac{3}{4}$ " of smooth plate would grind only an additional 10,000 tons.

The problem was solved by replacing the ribs with steel bars which proved highly satisfactory and reduced liner cost nearly 70 per cent. The method was pioneered at Stibnite under the supervision of Robert Clarkson, mechanical and construction superintendent.

In the first experiment, 20 mild steel, rectangular ($1\frac{1}{2}$ by 8") lifter bars were bolted lengthwise of the mill to replace the original waves. Each bar was made up of two 6' sections for easy handling and bolted through with the regular lug bolts. These bars ground 76,000 tons and would have handled 80,000, and there was no measurable wear in the valleys. A new set, soon to be installed, will be 2 by 8" manganese steel bars.

The adoption of this practice resulted in immediate savings. The cost of the mild steel bars was about one-fourth the cost of new liners, and installation costs were also lower. Liner cost, which had averaged 6c per ton, dropped to about 1.6c with the installation of the new lifters.

Mr. Clarkson expects that about two more years of experimental work will be necessary to accumulate complete and accurate data on performance and costs with manganese steel bars, but it is expected that the hard alloy steel will be more satisfactory and less expensive than the material that has been in use.

a plug on a rod is dropped into the feed line leading from its wear box. When ready to resume operation, the plug is simply withdrawn. Once the weir levels are set, adjustments are seldom needed.

The secondary grinding section consists of five ball mill and classifier units. It is not mechanically or metallurgically the most desirable arrangement but is made up of combinations of various types of equipment available during the war years. It includes: Three 8' by 48" Hardinge conical mills in closed circuit with 60" Memco spiral classifiers, one 8' by 36" Hardinge mill and 72" Dorr rake type classifier and one 86 Marcy ball mill in closed circuit with a 72"



Robert J. McRae, mill superintendent, thinks that antimony metallurgy is finally established.

Wemco spiral. All units seem to give satisfactory results.

The classifier overflows are maintained at 45 per cent solids. This is very high, and classification of pulp at this density can be obtained by holding a high pH (always above 9—average 9.8). Satisfactory classification with the natural pulp at a pH of 6.8 can be done at not more than 25 per cent solids. Soda ash can be used and is added to the rod mill feed belt to increase alkalinity. It is satisfactory insofar as its function in the flotation circuit is concerned, but it seems to have an adverse affect on dispersion. It has been found that if the soda ash is used in combination with caustic soda, which is fed to the rod mill, the result is almost as satisfactory as using all caustic soda.

The classifier overflow from the secondary grinding section, which is pumped to flotation, shows a screen analysis as follows:

Size	% Wt. on this size
Plus 48-mesh	4.80
Plus 65-mesh	8.42
Plus 200-mesh	38.53
Plus 325-mesh	13.00
Minus 325-mesh	35.25

A regrind circuit for grinding the rougher concentrates before cleaning operates as part of the grinding section. It consists of a 5 by 8' Joshua Hendy cylindrical ball mill in closed circuit with a 72" Dorr duplex classifier flared to 96" at the overflow. This mill operates with a 6-ton ball charge and receives 220 tons of rougher concentrate, about half of which overflows the classifier without any grinding. The classifier overflows ranges from 10 to 12 per cent solids and is all minus 200-mesh and 85 per cent minus 325-mesh. Make-up balls are all one inch.

The regrind practice allows for a high rougher recovery at a rather coarse grind, and by regrinding only 12 per cent of the feed tonnage a high grade concentrate is produced.

Flotation Is Complex

Reagents, their amounts and points of addition are shown in the accompanying table. They will be discussed in the text only where they have an unusual function or bearing on the separation technique. The only uncommon réagent used is lead acetate for the activation of stibnite, and a combination of caustic, copper sulphate, and sodium sulphide is used as a depressant for stibnite in the final separation step.

The most difficult part of the entire operation and the "trick" of the metallurgical practice is the close control of the alkalinity. By the same token, juggling of the pH is responsible for the largest part of the reagent cost.

The flotation of Yellow Pine ore into a bulk stibnite, pyrite, and arsenopyrite concentrate and the separation of this into an antimony concentrate and a gold (pyrite-arsenopyrite) concentrate is rather complicated. A high recovery of these minerals in a bulk concentrate is difficult because stibnite floats best at a pH between 6.5 and 7.5 and pyrite and arsenopyrite best from 9.5 to 10.5. Practice is to float at a pH of 8.4 to 8.7. There is really no favorable average range for the two minerals;



Blackie Silva, Si De Foo, and Chris Lee at the end of a shift in the mill.

but at this intermediate pH, reasonably high recoveries of all minerals are made.

The rougher flotation section consists of three identical banks of eight 56" Fagergren and two 48" Agitair cells. Four ounces of air pressure are maintained on the Agitairs, and all 30 cells are in series.

Originally the section was operated as three rougher units in parallel with the pulp being divided among them after being conditioned for thirty minutes. It was found, however, that much better metallurgical results were obtained by running the entire tonnage through all cells; and the conditioning, even at a pH of 8.4 to 8.7, was detrimental to stibnite recovery. Current practice is to pump the classifier overflow without conditioning to the head of the first bank of roughers, lowering the pH to 8.4 to 8.7 en route by the addition of copper sulphate and lead acetate.

About 80 per cent of all mineral recovered, both antimony and gold, is saved in this first rougher circuit. Tailings flow to six 8 x 8 x 8' concrete conditioners with Galigher agitators. Pulp is conditioned for thirty minutes, thus preparing the fine arsenopyrite for flotation, and is later pumped to the first cell of the second rougher circuit.

Alkalinity in the first five cells is held at a point only slightly below that at which it entered the flotation circuit, but the solids have been reduced to about 35 per cent by the return of cleaner tailings to the conditioners. Most of the fine arsenopyrite is recovered in these five cells,

Primary grinding is by this 9½' x 12' March rod mill, which discharges onto a 1¼" Allis-Chalmers low-head vibrating screen. This is one of the two largest rod mills in the world (an identical unit is used by the Anaconda Copper Mining Company).





Final reduction of ore to minus 1½" is accomplished with this 5½' Symons shorthead cone crusher and 5 x 10' Ty-Rock double-deck screen. The top screen is 2" square mesh and the bottom is 1" square mesh. The units are not in closed circuit.

Chronoflo scale. All belts and all feeders are interlocked with the rod mill so that if the mill stops feeders and belts stop automatically.

The operation of this feeding system has been entirely satisfactory. The feed chutes and feeders were locally designed to meet the severe winter operating conditions, and frozen chunks up to 8" in diameter can be pulled through them without checking the feed.

The rod mill is a 9½ by 12' Marcy. (An identical unit is in use at the

MARCY MILL DATA

Dry tons per mill hour.....	100
Pounds rods per ton.....	1.33
Power consumed, KWH per ton.....	4.10

SCREEN ANALYSIS ROD MILL FEED

Size	% Wt. on this size
Plus 1.5 inch.....	5.20
Plus 0.5 inch.....	49.40
Plus 10-mesh.....	35.80
Plus 48-mesh.....	5.67
Minus 48-mesh.....	3.93

SCREEN ANALYSIS ROD MILL DISCHARGE

Size	Per cent this size
Plus 10-mesh.....	1.34
Plus 20-mesh.....	20.05
Plus 48-mesh.....	34.10
Plus 200-mesh.....	16.80
Minus 200-mesh.....	27.71

cept as disgorged by the mill. This scrap amounts to about 0.22 lbs. per ton ground. All suitable scrap is saved and cut into billets about 2" long and fed to the ball mills. The rod mill is operated in open circuit with a discharge density of 75 to 80 per cent solids. The discharge passes over a 4 by 8' Allis Chalmers low head vibrating screen with ¾" openings to scalp rod scrap and oversize material. Screen undersize is pumped to the distributor in the secondary mill building; oversize, amounting to about 100 lbs. per shift, is returned to the feed belt by hand.

No trouble has been experienced in balancing the primary and secondary units. With all of the five secondary units running the tonnage is held so as to average 100 dry tons per hour. The rod mill seems to operate well on a feed rate of 10 per cent greater or less than the 100-ton average with only a small change in the discharge product. Power consumption remains substantially the same per hour. The minimum feed rate for the mill grinding in open circuit with a full rod charge is from 75 to 80 tons per hour. The mill is noisy and the load too light below this rate.

Secondary Grinding

The rod mill discharge is diluted to 75 per cent solids and pumped by a B-Frame 4" Allen-Sherman-Hoff hydroseal sand pump through 140' of 4" iron pipe against a 22' gravity head to a distributor. The pulp flows by gravity from the distributor to the classifiers of the secondary grinding circuit.

Considerable thought was given to the design of a distributor that would cut the pulp into five fractions, only three of which are equal. It also had to have flexibility so that if one of the secondary mills was down, its portion of the feed could be quickly distributed among the other units in proportion to the grinding ability of each. If, however, a secondary mill is down more than thirty minutes, the rod mill feed would have to be reduced somewhat. Therefore, it was finally decided that the agitator type distributor with weir overflow would be the most suitable. The unit was made from a 7 by 8' circular steel tank. Adjustable overflow weirs 10" wide were cut 12" below the rim of the tank. Individual riser wells extend down on the inside of the tank for 18" below the weir lips. The top of the riser wells are flush with the top of the tank. A box on the outside of the tank at each weir takes the weir overflow and forms a head box for the feed line to a secondary classifier. A 24" rubber covered propeller type agitator turning 280 rpm. and drawing 9-hp. with a 3' submergence furnishes ample agitation. The weirs, protected by the riser wells, give a steady overflow though there is a slight surging action, but it is uniform around the tank. The feed enters the distributor somewhat tangentially across the top of the tank so that the pulp flow is with the direction of the swirl imparted by the impeller. Adjustment in feed to any mill is made by taking out or putting in weir bars from 1½ to 1½" in thickness. If a mill is to be shut down,

AVERAGE REAGENT REQUIREMENTS

Reagent	Point of addition	Condition	Lbs. per ton
Na ₂ CO ₃	Belt to Rod Mill	Dry	.578
NaOH	Rod Mill	20% Sol.	1.25
PbAc ₂	Head First Rougher	10% Sol.	.50
CuSO ₄	Head First Rougher	Sat. Sol.	.32
Z-4	Head First Rougher	10% Sol.	.125
Z-4	Staged First Rougher	10% Sol.	.0125
CuSO ₄	Primary Cond.	Sat. Sol.	.16
Z-4	Primary Cond.	10% Sol.	.035
PbAc ₂	Staged No. 2 Rougher	10% Sol.	.05
H ₂ SO ₄	Staged No. 2 Rougher	98% Sol.	.68
Z-4	Regrind	10% Sol.	.01
NaOH	Regrind	20% Sol.	.025
Z-4	First Cleaner	10% Sol.	.01
Pine Oil ⁺ & B-23	Head First Rougher		.15 to tail
Z-4	Separation	10% Sol.	.015
CuSO ₄	Separation	Snow Crystals	.40
NaOH	Separation	20% Sol.	.15
Da ₂ S	Separation	10% Sol.	.045

* 1.5 when no soda ash for 1% ore. Increase to 1.65 with 1.25% heads
 + 50-50 mix
 † Frother is also staged in all roughers and turned on when needed.

plant of the Anaconda Copper Mining Company in Montana.) It is direct driven at 16.6 rpm. (65.2 per cent of critical speed) by a 450-hp. synchronous motor. The rod charge is 54 tons and 3" Sheffield "moly cop" alloy steel rods are added every other day. Rod scrap is not removed ex-



Banks of Fagergren flotation cells used in the rougher circuit.

and $\frac{3}{4}$ lbs. per ton of sulphuric acid is added at the sixth cell to drop the pH to about 7.3 for the balance (15 cells) of the circuit. This is done primarily to scavenge the more difficult stibnite mineral. The froth contains very little gold.

The concentrate from all 30 roughers, amounting to about 12 per cent of the total mill feed, is sent to the regrind classifier. The overflow of this classifier is conditioned for 15 minutes with Z-4 and caustic soda in six 6 x 6' cylindrical steel tanks and cleaned in eight Pan American 44" cells. The tailings from the first cleaner return to the conditioner ahead of the second rougher circuit.

The second, third and fourth stages of cleaning are done in No. 24 Denver "Sub A" cells, and all cleaner tailings return to the first cleaners. The density in each cleaning step is held at 12 to 15 per cent solids.

The flotation section is extremely flexible and can be switched from treating antimony-gold ore to straight gold ore, or vice versa, without stopping. If treating straight gold ore, the fourth cleaner froth is the final gold concentrate which is sent to the gold thickener.

At the present time, however, the accent is on antimony recovery; and the bulk concentrate from the fourth stage of cleaning flows to three 5' steel conditioning tanks where it is conditioned 25 minutes with caustic, copper sulphate, and sodium sulphide. This conditioning step raises the pH to 11.5, thoroughly depresses the stibnite and to some degree depresses the pyrite and arsenopyrite. The conditioned pulp is then aerated 10 minutes in two 44" Pan American cells. Any froth that rises in the cells is beaten down with sprays. After about 6 to 8 minutes of aeration the pyrite and arsenopyrite become highly activated and the froth is heavy with the two minerals.

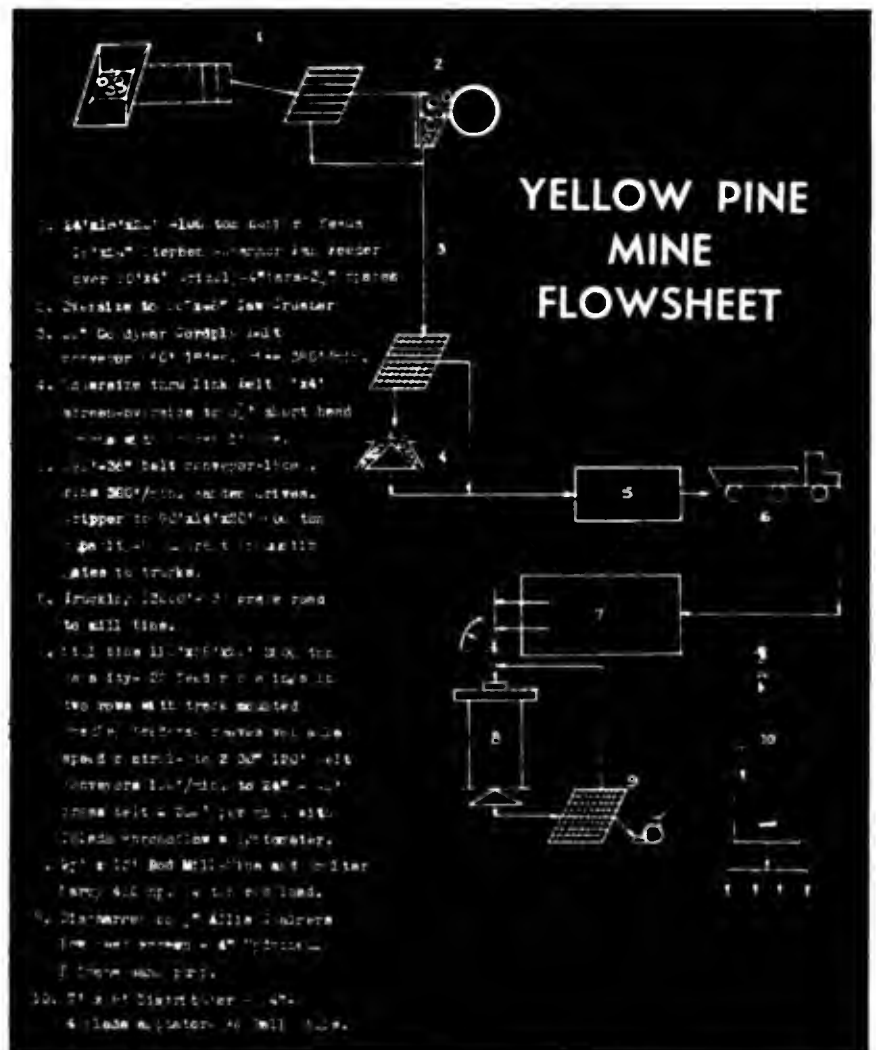
The aeration is important. There is no metallurgical reason for it, and the physical or chemical change that takes place is not known. However, the separation is successful, and without the aeration step it is not.

Flotation of the gold bearing minerals takes place in three 44" Pan-American cells. The tailing from them constitutes the antimony concentrate which is sent to the antimony thickener. The froth concentrate is sent to four similar cells for cleaning. In this cleaning, about half of any stibnite that floated with the pyrite and arsenopyrite in the previous step is dropped out. This froth is the gold concentrate and is sent to the thickener. The tailing is a low grade (20 per cent) antimony product that is shipped to the Bunker Hill & Sullivan leach plant for conversion to electrolytic antimony.

The difficulty involved in the sep-

aration step is in keeping the caustic and copper sulphate balanced. The quantities of these reagents must be varied as the ratio of stibnite to pyrite changes. If the caustic is too high or the copper sulphate too low, pyrite is depressed into the antimony concentrate. If the copper sulphate is too high or caustic too low, too much stibnite is floated into the gold concentrate. Since the antimony concentrate is a tailing product, any insoluble or middling in the bulk concentrate tends to go into the antimony. This is one of the ever pressing problems in making a 50 per cent antimony concentrate, particularly with lower grade ore.

The gold and antimony concentrates are thickened in 30' Deco thickeners. A 6-disk, 6' American leaf filter handles the gold while a 5'4" by 8' Oliver drum filter dewater the antimony. The low grade product is thickened in a 14' tank that overflows to the gold thickener and is filtered on a 5'4" by 6' Oliver drum. The antimony concentrate is dried on a 6 by 30' oil fired Lowder drier. All



products are stored in flat bottomed bins and loaded into trucks by a D-4 caterpillar with Traxcavator loader attachment.

Nine Autocar and dirt trucks powered by 150-hp. Cummins and 200-hp. GMC diesel engines equipped with Heil and Olson dump bodies are used for hauling the 80 miles to the railhead at Cascade.

Tailings Disposal

The area developed for mill waste storage starts 1,700' west of the mill. It is approximately 1,300' wide and 5,500' long with an area of 171.60 acres. It provides immediate storage capacity for about 10,000,000 tons with possibilities of doubling this capacity at minimum expense.

Tailings are delivered to the pond by two B-Frame 6" Allen-Sherman-Hoff hydroseal slurry pumps in series pumping into an 8" line of Naylor spiral welded pipe against a static head of 14' and a friction head of about 100'. The installation is unusual in Western mines in that the two pumps are inserted in the line within a few feet of each other. It is claimed that each carries half of the head and that the practice is much simpler and fully as efficient as staging the pumping units at intervals along the line.

Pulp is spotted along the face of the dam by a distributor of 6" wood pipe running each way from the main line. The distributor is opened by spigots at 10' intervals, and flow to either side of the main pipe is controlled by pinch valves. Wooden plugs close spigots that are not in use.

Meadow Creek is diverted at the upper end of the area by a four foot dam to a canal along the south hill-sides. This canal is five feet wide and five feet deep with a grade of 0.2 per cent. The project was started by building an earth embankment, 900' long and 20' high at the center, across the canyon. In successive stages upstream from this crest, layers of mill sands are deposited. They will eventually raise the dam to over 50'. As the slope of these sands is very flat and the slime portion of the pulp is largely settled out in the upstream pond a very stable structure is being

UNITED YELLOW PINE MILL

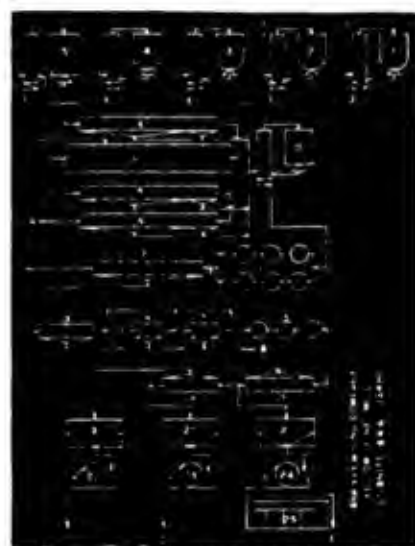
1. Hardinge 8 x 4 foot Ball mill 200 hp. closed with Wemco 60" x 23' 3" Wemco Spiral classifier.
2. Hardinge 8 x 3 foot Ball mill 150 hp. closed with a Dorr 6' x 26' Duplex classifier flared to 8 feet at the weir.
- 3 and 4. Hardinge 8 x 4 foot Ball mills 200 hp.-225 hp. closed with Wemco Spiral classifiers 60" x 23' 3".
5. Marcy #86—250 hp. 72" x 23' Wemco Spiral classifier.
6. No. 1 Rougher Circuit 2—48" Agitators 8—56" Fagregren cells.
7. 6—8' x 8' x 8' concrete primary conditioners.
8. No. 2 Rougher circuit ditto No. 1 Rougher.
9. No. 3 Rougher circuit ditto No. 1 Rougher.
10. 4 1/2 x 8 Hendy Ball mill 100 hp. closed with a 6' x 26' Dorr duplex classifier flared to 8' at the weir.
11. 6—6' x 6' steel circular conditioners.
12. No. 1 cleaner circuit 8—42" Pan American cells.
13. No. 2 cleaner circuit 4—#24 Denver cells.
14. No. 3 cleaner circuit 2—#24 Denver cells.
15. No. 4 cleaner circuit 2—#24 Denver cells.
16. 3—5 x 5 circular steel conditioner tanks.
17. Separation circuit 5—42" Pan American. 2 cells Aeration and 3 cells flotation.

built with very little water pressure behind it. A relatively clear overflow is decanted from the surface of the pond by weir boards in concrete towers and returned to Meadow Creek through a 22" steel conduit.

Local Concentrate Treatment

At the same time that the metallurgy of the Yellow Pine ore was being worked out, much effort and money was spent to determine the most economical and practical scheme for the local treatment of concentrates. When one considers that freight and treatment charges consume 25 to 30 per cent of the gross recovered values it is easy to realize the desirability of treating the concentrates locally. The following four schemes have been investigated in detail, and some large scale pilot tests have been run.

1. Roasting the gold concentrate and cyanidation of the calcine. The results so far will not compete with



18. Separation cleaner cells 4—42" Pan American.
19. 30-foot Deco Thickener, heavy duty, for gold conc.
20. 14-foot Deco Thickener for Sb #2 conc.
21. 30-foot Deco Thickener, heavy duty, for Sb Con.
22. American 6-leaf 6' filter for gold conc.
23. Oliver drum filter for Sb #2 Conc.
24. Oliver drum filter for Sb Conc.
25. 6 x 30-foot Lowden dryer for Sb conc.

shipping to the smelters because of low gold recoveries.

2. Partially roasting the gold concentrates and smelting the calcine in an electric furnace, collecting the gold and silver in an iron matte bullion. Ratio of concentration about 10 to 1. Matte to be shipped to a smelter. The economics of this are favorable, but the plant cost is high.

3. Roast the gold and antimony concentrates separately and combine the calcines smelt with reducing agent in an electric furnace, using the antimony as a collector for gold and silver. Refine the antimony bullion (remove the iron and arsenic) and then convert the bullion to antimony trioxide. Gold and silver are recovered in the converter residue. An alternative is to cast the refined antimony into anodes and electro-refine the antimony. The precious metals are recovered in the cell slime. The economics are attractive, but the capital plant cost is very high.

4. Leach the antimony from a bulk concentrate and electro win the antimony as cathode metal. The gold and silver in the leach residue could be recovered by shipping to a smelter or by treating the residue under schemes No. 2 and 3.

It is expected that construction will start about in 1948 on one of the first steps towards a local reextraction scheme now being developed.

ANALYSIS—TYPICAL METALLURGICAL PRODUCTS

Product	Gold in oz.	Silver oz.	Antimony %
Heads	0.085	0.70	1.30
Tailings	0.020	0.10	0.20
Bulk Conc.	1.720	14.80	29.00
Gold Conc.	2.930	8.00	1.50
Antimony Conc.	0.42	22.00	51.30
Low Grade Sb Conc.	1.50	8.00	20.00

Camera Records Highlights of Mining Congress Opener



One must eat—even at a convention. Here are J. R. Jogg Krebs, San Francisco, metallurgist; Curtis Clarkson, Siltville, Ida., Bradley Mining Co.; Kel-son, Mrs. Clarkson, Patricia Krebs and Mrs. Krebs. They are among the thousands visiting Salt Lake during four-day meet of the American Mining congress.

from The Stibnite Miner

STIBNITE, IDAHO, THURSDAY, OCT 25

1951

10/25/51



A very important mode of transportation in that area & time.

J. R. Clarkson (Bob), Construction Superintendent and pilot of the Company plane (Navion) resigns in order to devote his entire time to the Clarkson Co. Mr. Clarkson started as Construction Supt. 8-8-42 and resigned 10-4-51. He is being replaced by Mr. Arthur Kastrinos. In addition to supervising the tremendous amount of construction work that has been done the past nine years he took a very active part in community affairs, being a member of the Rod and Gun Club, Masonic Club, served on the local and county school boards, took an active part in scout work, and at the time of his termination was chairman of the Village Board. During Bob's time as Construction Supt. the huge construction program included along with many other things, construction of most of our present houses, recreation hall, hospital, service station, school house, alterations and additions to the mill, rod mill, crushing plant in the pit and the re-location of this plant which was just completed, the smelter, gravel plant, the new warehouse in the mill area. Bob invented and patented the Clarkson Re-agent Feeder which is now in use at different milling operations throughout the entire world. He has formed The Clarkson Co., which is now engaged in manufacturing the reagent feeder and also a centrifugal separator. The Clarkson Co. is now located at Bradley Field, Boise, Idaho.

Hydro Cyclone

& SAN FRANCISCO

(DEFINITION)

*This Was Nevada***The Buckhorn Jinx**

EDITOR'S NOTE: This is another in a series, "This Was Nevada," furnished by the Nevada Historical Society.

On the southeast slope of the Cortez Range in Eureka County lies the star-crossed ghost town of Buckhorn, a camp which developed following the discovery of a rich gold ledge in the area in 1900 by prospector Joe Lynn.

Financier George Wingfield acquired the claims in 1910 and erected a 300-ton cyanide mill four years later, but the mineral deposits did not prove to be as rich as the surface deposits indicated and the mill was shut down in February of 1916.

Some 300 citizens were living at Buckhorn at that time and the camp was replete with saloons, stores, livery stables, etc., but it became an instant ghost town within months of the closing of the mill.

In the fall of 1936, a second developmental phase began at Buckhorn, but a hard winter and deep snow drifts isolated the camp until mid-March of 1937. On March 15, a truck caravan succeeded in getting from Buckhorn to the Eureka-Nevada Railroad siding with a shipment of bullion concentrates, but further production was hampered by mechanical problems at the mill and the power plant.

There were also some minor accidents at the mines, breakdowns of trucks and any number of other small problems and the men working at the mill and the mines soon came to believe that the camp was jinxed.

C. W. Van Law, the general superintendent, was meanwhile being pressured by stockholders to get production going and he came up with a solution which is surely unique in the annals of American mining history, a formal funeral and burial of the camp's jinx. He first constructed an effigy, a dummy, and clothed it in cast-off miners' garb. A rough coffin was then nailed together and arrangements were made for the "funeral" which was to take place on May 1.

The trouble-weary miners assembled just at noon in front of Van Law's office, put a rope around the neck of the dummy and formed a solemn procession for the march to the gravesite on the edge of town. Dragging the dummy down the main street to the accompaniment of two dinner gongs, they arrived a few minutes later and gathered around the grave for a formal service.

Accordion music was played as the effigy was placed in the casket and the miners threw in a half bottle of cheap whiskey, broken gears, worn-out mill parts, a broken section of timber from an ore chute, a sack of tailings and other such items, all related to some portion of the mine or mill which had caused trouble during the past two months.

Van Law then delivered the funeral oration, declaring that the camp had been cleaned up and the equipment placed in good order, thus killing the jinx he was laying away. Following his short peroration, he ordered the coffin to be lowered into the grave, but mine foreman R. B. Spitzer stepped forward to place two blasting caps at the head of the "corpse" to ensure that it would never return to haunt the camp.

The grave was then filled and decorated with clumps of grass, sprigs of sagebrush and a special wreath made up for the occasion. At the foot of the grave an inverted cross was placed which bore a small sign with the following inscription:

Ye old Buckhorn Jinx is dead
'an gone,
Buried in style with a bottle
'o corn
Now we all know
The dirty so and so
Will stay in his hole forever.
May 1, 1937

The jinx never returned to haunt the camp, but prosperity was as elusive as ever and the mines at Buckhorn were closed by the end of the year due to the ore bodies playing out. If there is a ghost in Buckhorn today, it is quite unlike any that ever haunted other Nevada mining camps.

Bob Clarkson and his
Mill Crew Slayed the
Jinx



Buckhorn Mine Camp

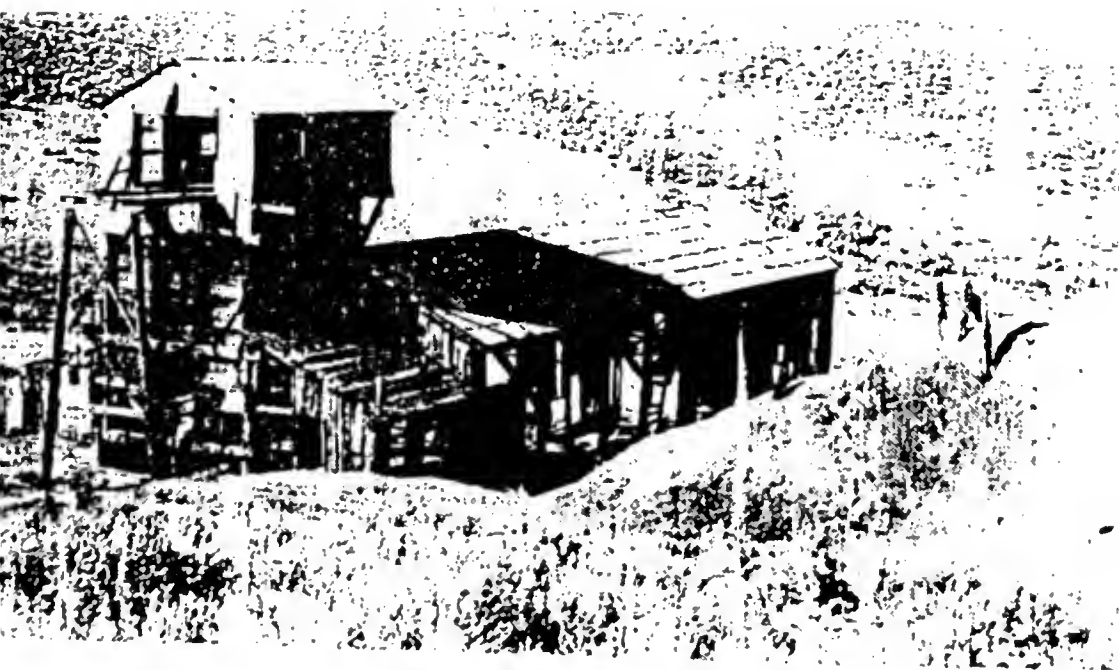


The Funeral and burial
rite for the Buckhorn Jinx

Photos by -
Bob Clarkson, Mill Sup



The Jinx burial
Procession



Ghosts

The camp of Buckhorn
as it appears today, a
ghost town haunted by a
peculiar type of spirit.

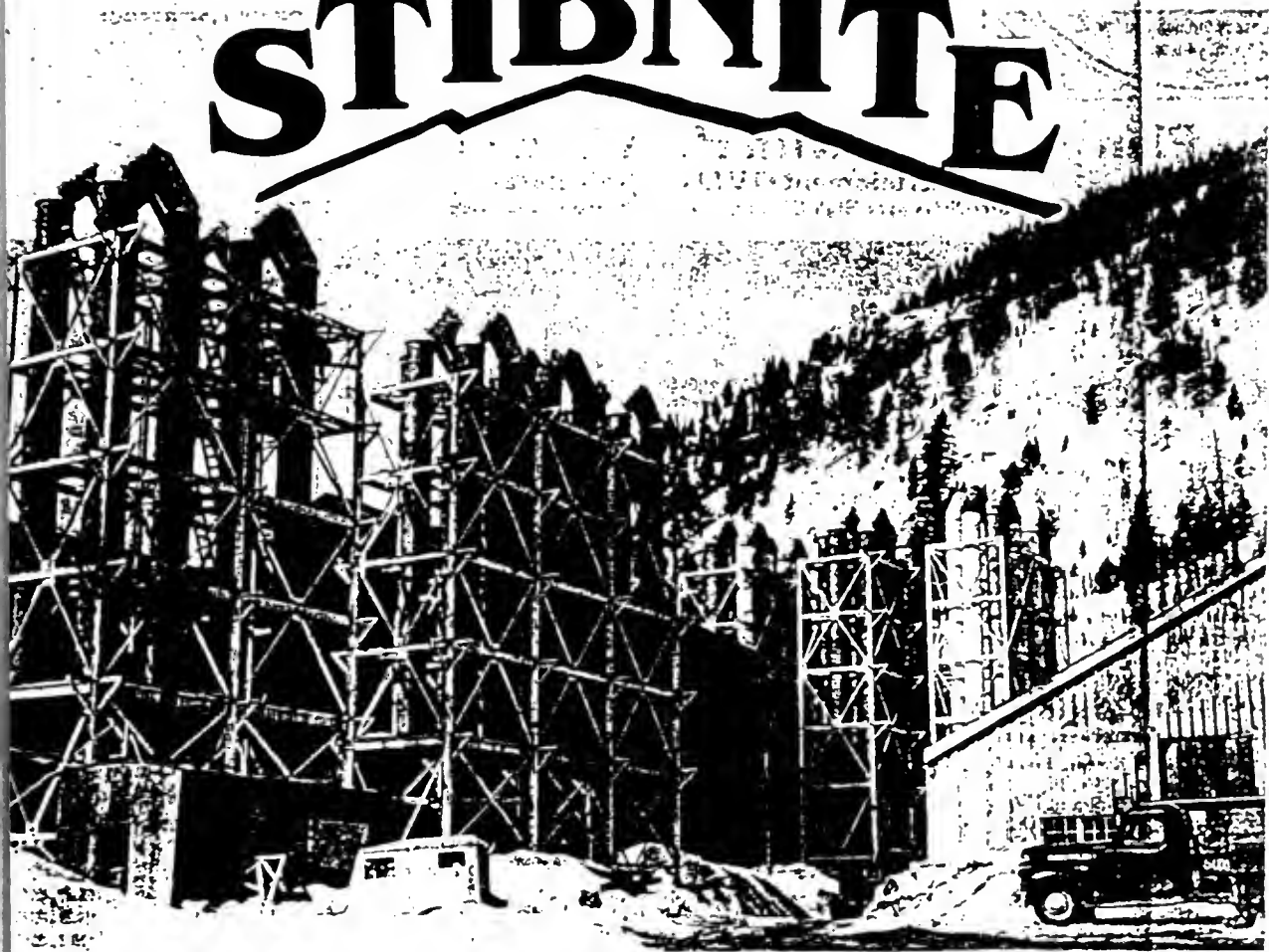
August 3, 1983

The
Central Idaho
star-news

Central Idaho's guide to television and entertainment

High Country Wee

STIBNITE



Smelter was the heart of the mining operation at old Stibnite.

Photo courtesy Robert Carlson

Mine workers gather for 30th reunion

About 180 people are expected to gather at Ponderosa State Park on Sunday to remember how they lived and worked together in the Idaho back country.

They are the men, women and children of the Bradley Mining Co. mine at Stibnite who braved difficult conditions to extract strategic materials for the nation's military.

The picnic, which will be the 30th annual such affair, is scheduled to be held from 11 a.m. to 5 p.m. A potluck is set to begin at 1 p.m. Beverages will be provided.

The reunions are well attended each year because the former community had a close-knit spirit and a shared feeling of contribution to the war effort during World War II, said Robert Clarkson, a summer resident of McCall who was construction superintendent at Stibnite.

"It was a rough climate to cope with to keep the mine operating year-round," said Clarkson, who is chairman of a mining-equipment company in Palo Alto, Calif. "They were unusual, capable; they liked that kind of life."

Antimony and tungsten were the main products of the

mine. Antimony was used in submarine batteries and in flame-retardant ship paint. Tungsten was used as a hardening agent in armor and armor-piercing shells.

Keeping the operation going during bitter winters was often demanding, he said. Snow depths reached six feet by April 1 and temperatures fell to under 30 degrees below zero. Work sometimes was brought to a halt because the cold had turned fuel oil in machinery to jelly.

Bradley officials tried to make life in Stibnite as comfortable as possible, Clarkson said. The town featured a bar, restaurant, bowling alley and weekly newspaper.

The centerpiece of the town was the recreation hall, in which movies were shown and basketball games staged, sometimes with high school teams flown in from Boise.

Dropping demand and cheap foreign imports of minerals led to the demise of the Bradley operation in 1952, Clarkson said.

But the area spawned new life last year when Superior Mining Co. of Spokane began production on a gold mine and processing operation on the Bradley site.



Pat Davison/Gazette-Journal

FAMILY BUSINESS: Curt Clarkson, left, and his father, J.R. Clarkson, pose in front of their new manufacturing plant on Spice Island Drive in Sparks on Thursday morning, their first day of production.

year

Clarkson, son return to mining country

Manufacturing firm outgrows Bay area, plants Sparks roots

By Sheila Muhtadi/Gazette-Journal

A McGraw-Hill poster hangs in the new Clarkson Co. office in Sparks, listing milestones in mining history.

J. Robert Clarkson, the 76-year-old company founder, delightfully points to one:

"1935 — American Cyanamid sold the first Clarkson reagent feeder for the mining industry."

Reagent feeders, which meter the flow of chemicals into other solutions, continue to be made. But now they are manufactured in a new 47,000-square-foot facility on Spice Island Drive.

And the Idaho farm boy who began his career as a mill laborer in a gold mine gradually built that and other mining inventions to a \$7-million-a-year business.

Clarkson and his son, Curt Clarkson, are also manufacturing a variety of slurry valves used in mining, power, pulp, paper and other industries. These valves control the flow of thick or abra-

sive fluids, such as mixtures of liquids and solids.

"The mining industry is in a recession, which it may take awhile to come out of, so we're always looking for new markets," said the younger Clarkson, now the company president.

And the company continues to grow despite that recession.

Bursting at the seams in its office in Palo Alto, Calif., Clarkson Co. went searching for the ideal relocation site and found Sparks.

Like Palo Alto when Clarkson arrived there 30 years ago, Spice Island Drive is spacious and quiet.

"Back in those days, the mid-peninsula area was orchards," the younger Clarkson said. "Now it's been replaced with manufacturing and electronics."

And there are other advantages, the Clarksons say.

Younger employees are able to buy homes they couldn't afford in the Bay area, the company can acquire additional space at less expense, suppliers are close, air transportation and freight is adequate, and resources such as the Mackay School of Mines, the University of Nevada-Reno Engineering School and the U.S. Bureau of Mines are nearby.

"We are looking for a different type of labor market" than that of the heart

of California's Silicon Valley, the elder Clarkson explained.

"We're not a high-tech company," the younger Clarkson said. "We are a mechanical engineering-oriented company."

Clarkson Co. brought 30 employees from the Bay area and hired another 17 locally.

Original employees maintained the salaries they were earning in Palo Alto and employees hired locally are paid wages "comparable to companies here."

The move also enabled the company to cut its staff from 65 to 47. The Clarksons said the new plant can be operated more efficiently because they combined two offices and added space.

Clarkson Co. also moved its computerized manufacturing plant, which includes lathes, milling machines, drill presses, cutoff saws, handling cranes and welding stations.

Although the machine parts are cast at foundries in the western United States, Clarkson employees shape and finish the parts and assemble, paint and package them.

All the patterns and molds used in the various foundries also belong to Clarkson Co.

See CLARKSON, page 5B

Clarkson

From page 8B

The company is prepared to expand production in the Sparks plant.

"We're developing a new product line that has a great deal of potential," the younger Clarkson said. "We expect to double our size in the next five to six years."

Though the Clarksons are ready to grow, they plan to limit their scope to the business they know.

"Our company is entirely built

on our own entrepreneurship," the elder Clarkson said.

Over his career, he is credited with several inventions, including a variety of slurry valve designs and a new rod mill liner design that became a basic liner design for large mills. He also played a major role in development of the Krebs hydrocyclone, an industry standard for closed circuit grinding.

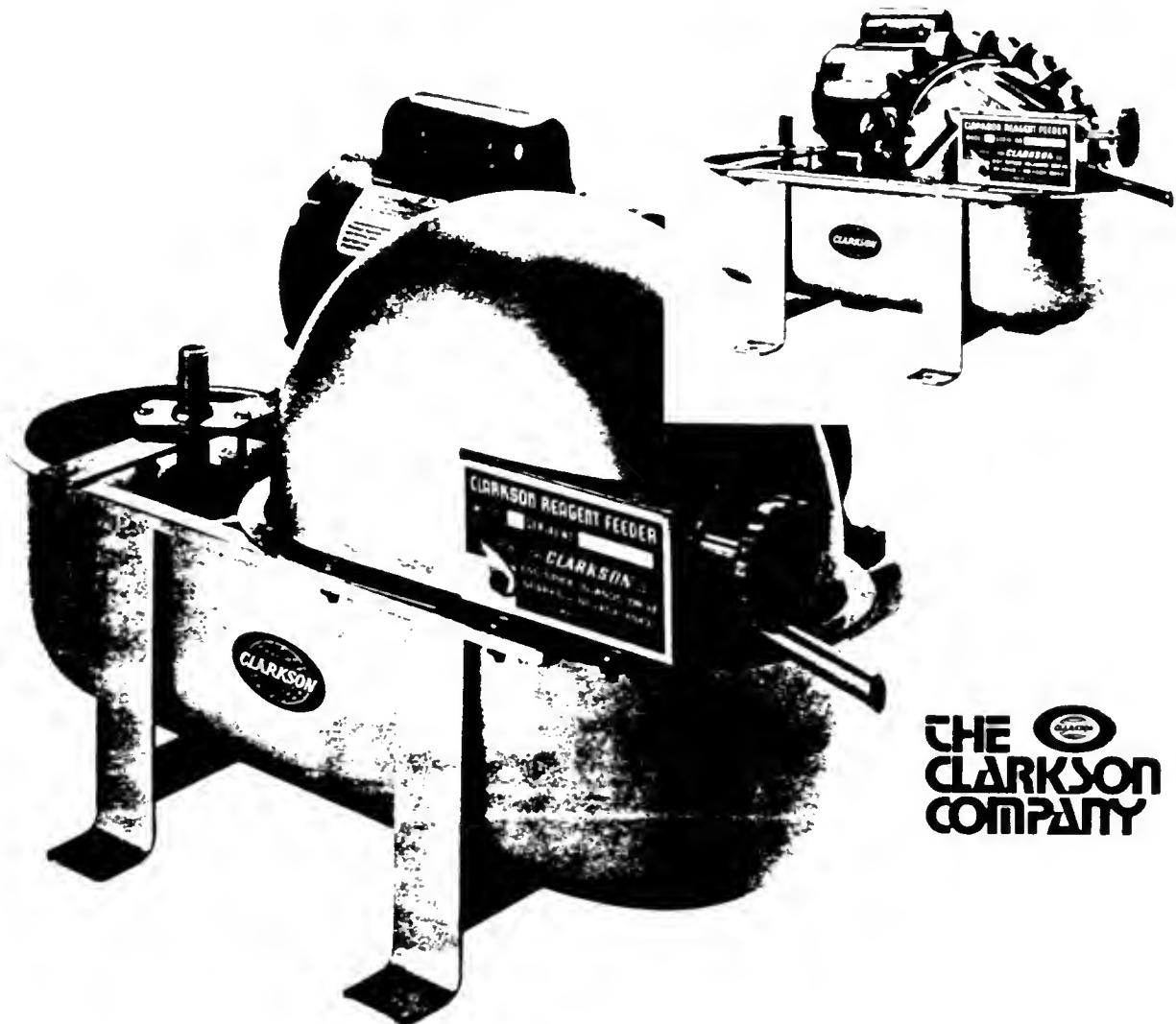
A rod mill liner lines the inside of a grinding mill, protecting the mill from being dented by the grinding action.

"The Standard of the World."

Clarkson

LIQUID
REAGENT

Feeders



THE  **CLARKSON**
COMPANY

NOW USED IN OVER 80 COUNTRIES and all of the 50 United States

The Clarkson Feeder has been in use since 1936. It was invented to overcome problems California mill operators were having in the processing of gold ore. One problem was that feeding equipment of that day couldn't stand up to the corrosiveness of the reagent being used; and another problem was with the feed rate — it was much too hit-or-miss.

By utilizing stainless steel (the first such apparatus to do so) the Clarkson Feeder overcame the corrosion problem. And its ingenious use of the cups-on-a-wheel principle assured precise control of feed rate.

The Standard of the World

Word spread quickly about the dependable new feeder out in the California gold country and orders flooded in from mining regions in other parts of the U.S. and overseas. Upwards of thirty thousand are now in use, and users often volunteer such comments as —

"It's as dependable as day and night."

"It just keeps ticking along, day in and day out, doing its job."

Today in any mining area around the world, whatever the native tongue, the English words "Clarkson Feeder" are instantly understood. Indeed, even though it's a brand name, "Clarkson Feeder" has become the generic term for liquid reagent feeding.

More useful than ever

The "Clarkson Feeder" has taken a new look. The cast aluminum tank frame that formed the feeder's external appearance has been replaced by a fabricated stainless steel frame. This makes the feeder more corrosion resistant than ever, leaving the motor and adjusting wheel as the only non-stainless steel parts. As shown on the opposite page the feeder's usefulness is broadened by its optional and auxiliary equipment.

Applications

Primary usage is in the processing of virtually all metallic and non-metallic minerals. Also used in food processing, to feed flavor additives and syrups; in treating water with various chemicals. In the pulp and paper industry hundreds are in use, for feeding tints and dyes to color newsprint.

HOW IT WORKS

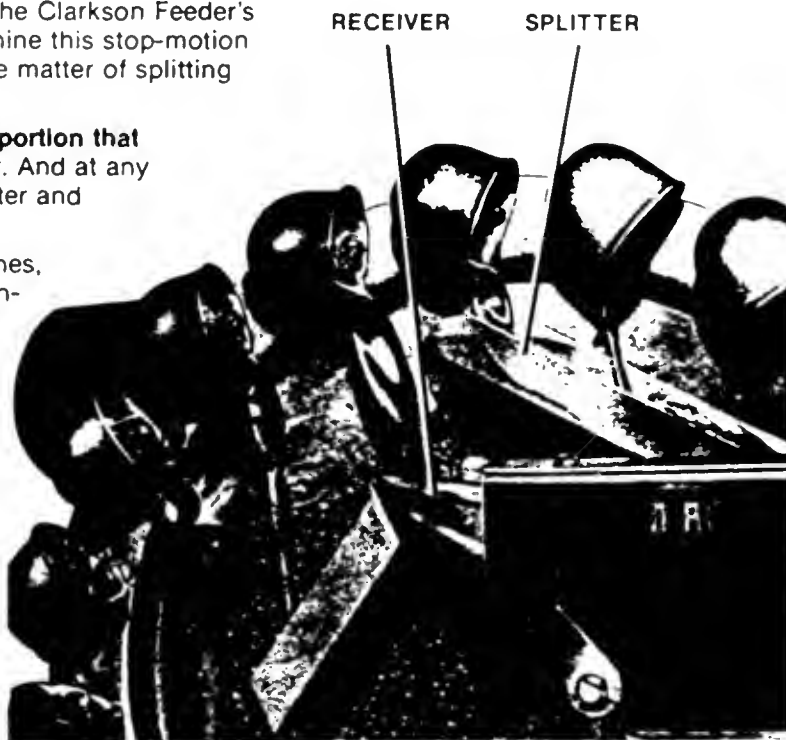
There really is no great secret about the Clarkson Feeder's dependable control of feed rate. Examine this stop-motion photograph and you'll see it's a simple matter of splitting a falling stream three ways.

The middle "cut" of the stream is **the portion that goes into the process**, via the receiver. And at any given setting of the gap between splitter and receiver* **this portion does not vary.**

That's the principle; but behind the scenes, so to speak, these other constants contribute to the dependability of feed rate: the cups pick up the same amount of liquid at each turn because the liquid level in the feeder tank is maintained by a float valve; the cups are in a fixed position on the wheel; and the cupwheel turns at a constant speed.

As shown in the table on the back of this bulletin, the feed rate with Clarkson Feeders can be varied all the way from a few drops per minute to a half-gallon.

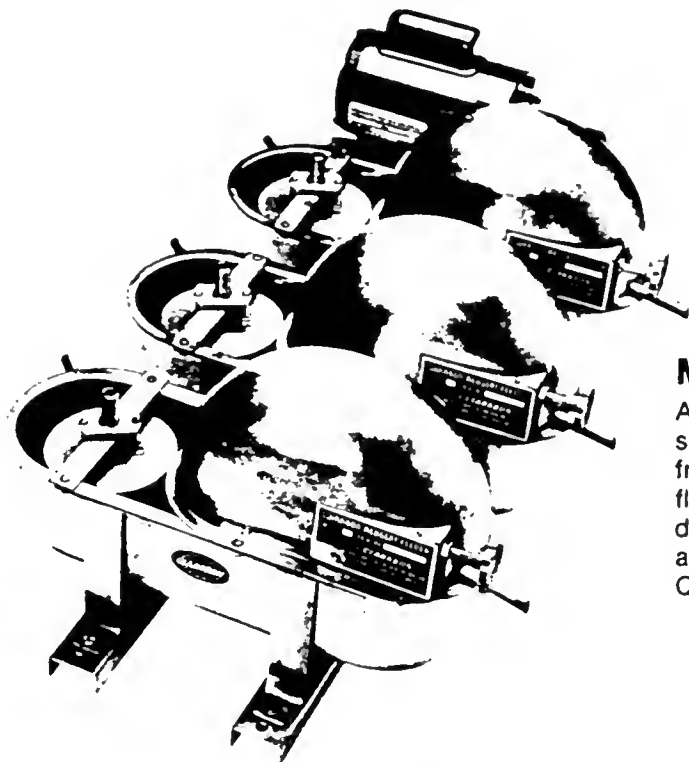
*Adjustable by means of the hand-wheel



Adaptations and Auxiliary Equipment

FLOW DISTRIBUTION

The Flow Distributor shown here with a reagent feeder mounted on the top is used for feeding multiple points, from two to twenty. Bulletin No. 20-03.



MULTIPLEX FEEDERS

A Triplex Feeder in 304 stainless steel is shown here. All Multiplex Feeders are driven from a common motor, but utilize individual float valves for feeding a common reagent or different reagents in each unit. Feeders are available as Simplex, Duplex, Triplex and Quadruplex in 304 stainless steel.

ADJUSTABLE SPEED MOTOR CONTROL

This adjustable speed controller and DC motor combine to provide remote manual or automatic feed rate control of the Clarkson feeder.

Gearmotor: Baldor, 1/12 hp, TENV
Input - 0-90 VDC
(w/115 VAC Power)
- 0-180 VDC
(w/230 VAC Power)
Output - 0-25 RPM

Controller: Boston Gear Beta Series
Power - 115 VAC, 50/60 Hz
Run/stop toggle switch
One (1) turn potentiometer
for motor speed control
Output - 0-90 VDC
TENV enclosure
Use w/90 VDC gearmotor
Alternate power - 230 VAC,
50/60 Hz
Use w/180 VDC gearmotor



**Optional
Automatic
Control:**

4-20 mADC input control
signal card
Auto/Manual selector switch
This will provide final control
from a process controller which
sends a 4-20 maDC control signal.



Clarkson REAGENT FEEDERS

MAXIMUM FLOW RATES

Model E in 304 stainless steel	B1 Cups		B2 Cups	
	10 Cups	20 Cups	10 Cups	20 Cups
c.c./min.	1,000	2,000	100	200
c.c./hr.	60,000	120,000	6,000	12,000
gal./min.	0.26	0.53	0.03	0.05
gal./hr.	15.8	32	1.6	3.2
gal./24 hrs.	380	761	38	76

MAXIMUM FLOWS—Approximate maximum flow rates are shown above, based on capacities of 100 c.c./cup/min. for the B1 (large cup) and 10 c.c./cup/min. for the B2 (small cup) in 304 stainless steel.

The Models E2, E3 and E4 in stainless steel will have maximum flow rates of 2, 3 and 4 times respectively of those shown.

MINIMUM FLOWS—In the lower ranges, several smaller cups give more precisely adjusted control by the mechanism than one large cup. When required, the feed rate can be adjusted to as little as a few drops per minute.

VISCOSITY—Capacities are based on water at room temperature. Feed rates for higher viscosity liquids will be lesser than those shown.

VOLUMETRIC CONVERSIONS

1000 Cubic Centimetres = 1 Litre = 1.0587 Quarts = 0.26417 U.S. Gallons

1 U.S. Gallon = 3.78543 Litres = 231 Cu. In. = 0.134 Cu. Ft. = 8.345 Lbs. Water

1 Cu. Ft. = 7.481 U.S. Gallons = 62.42 Lbs. Water.

TYPICAL ORDERING SPECIFICATIONS

E-1 Clarkson Liquid Feeder in 304 Stainless Steel, with ____ B-____ cups on wheel, complete with cover, float valve and integral gearmotor for ____ volt ____ cycle, single phase power, with switch and 6' cord.

Integral 1/12 hp TEVN gearmotor available for 115 V 50-60 Hz, or 230 V 50-60 Hz power.

Multiplex units using common gearmotor are available in Duplex, Triplex or Quadruplex.

Net weight — 32 Lbs, 14.54 kilos.

Approximate cube — 3.2 cu. ft. 0.09 cu. meter.

DIMENSIONS, Clearance

Length 20½", Height 12¾", Width 13"



P.O. Box 12037 • Reno, Nevada 89510-2037
650 Spice Islands Drive • Sparks, Nevada 89431
Telephone: (702) 359-4100 • Telex: 170026
FAX: (702) 359-4306

YESTERDAY'S WORLD

Childhood Memories of Horseshoe Bend

By John Robert Clarkson

As a native of Horseshoe Bend and a descendent of pioneer settlers of the area, I have fond memories of my growing up years there. My grandparents, both sides, were early settlers in that little valley arriving several years before Idaho was made a state. They were attracted to the West first by the lure of mining for gold and then taking up homestead land for farming for many a better or supplementary way of making a living and raising their family.

For me, a boy, the youngest of four, two sisters and a brother, Mary, Etta and Sam, there was a blend of natural and man-made resources making the scenic valley on the Payette River a unique and wonderful place to grow up, probably not much appreciated at the time. The scene, two villages separated by the river, family farms along the river and on every tributary stream, a hydro-power plant and its canal, the railroad and its trains, water tank and bridges, a nearby coal mine and even some gold mines down along the river. All surrounded by mountains fringed high up with tall timber and laced with sparkling streams that irrigated farm fields, gardens and orchards. Streams that could rapidly become a rampaging torrent from springtime snow melt or a summer cloudburst. A few sawmills operated in or near the timber and those worked along with other seasonal activities that started with the arrival of spring. Farm plowing and planting, livestock

work and so on through to summer haying, and fall grain threshing, even some seasonal logging, wood cutting and lumber hauling, all provided certain jobs for boys to do. Hard work, like it or not, the learning experience was invaluable and of course a little cash to jingle in the pocket was pretty important to a kid.

Also, not the least in my memory was the good hunting and fishing, just about whatever one chose to go for. Then there was summer fun swimming in the river or canal. During those months water diversion from the river into the canal lowered the flow around the bend to create some ideal swimming holes and big sandy bars.

Incidentally, the diversion dam structure at the canal headgate was a removable weir type designed to be taken out for the period of winter ice and high spring run-off. In that time there were no storage dams upstream to control the river's seasonal run-off, therefore, the flow dropped down through the summer and into late fall.

The most popular swimming hole was just below the dam where a swimmer could high dive off the fish ladder into a water depth of 10 or 12 feet. The next most popular spot was at the mouth of Shafer Creek which had a big sand bar and a wide shallow stretch below the deep area where the river was easily fordable for a short cut to a favorite section of the canal where it crossed the flat and onto the north side. Finally, the ultimate was a big deep

hole under the two bridges rail and wagon, a place only considered safe for good swimmers and divers. It was also a great place to sit on the shore's outcropping rocks to snag or snare a big sucker fish cruising along in the clear water. In earlier years it could have been salmon.

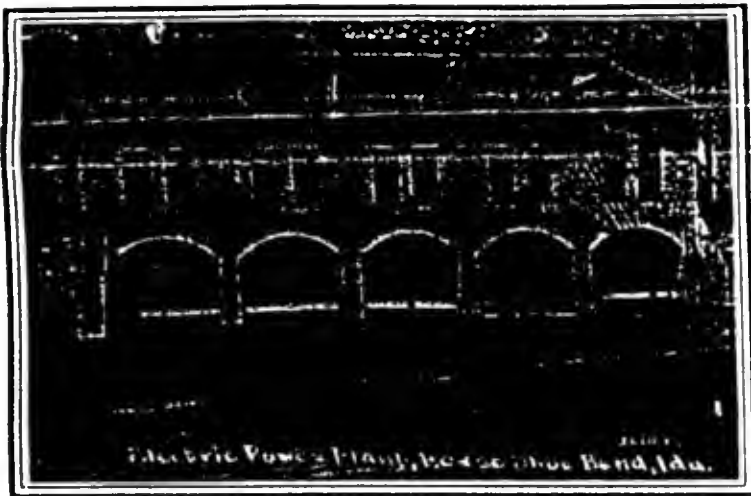
My dad, Frank Clarkson, often told stories of his boyhood years when the salmon, whitefish and reddsides provided a plentiful supply of fish. I only got in on the final days of that declining resource.

Come winter, those swimming holes or the canal also

were places to cut ice for the family icehouse, cold hard work that had to be done. Stored ice, like the swimming holes, provided for a cool respite from hot summer days. In a kid's thoughts, ice cream or a watermelon that had been chilled while buried in sawdust covering the stored ice. The season of ice on ponds, the river and canal also provided some good skating fun, not over the deep holes however. The canal, with lowered winter flow, offered one of the

better and safer skating sites. Also it was the time of year for horse drawn bob sleds for work and getting about.

Into this peaceful period of time, as in all of America, came World War I and its sobering effect on the community. Automobiles were just becoming commonplace but still only practical during summer months with existing wagon roads.



Above: The Horseshoe Bend Electric Power Plant

Below: Payette River Bridge at Gardena, circa 1918



Post war economic recovery was pretty meager for most families in the area. The beginning of highway construction on the route between Boise and McCall, starting in the early twenties, brought some new work. The coming of cars, auto stages and trucks created pressure for better county and state roads. The first section of state highway, about five miles, was built along the river above the bend. On a subsequent section contracted to be built, my dad obtained a sub-contract to cut, fill and grade the original section of highway across the bench flat just above town. It was all done with horse drawn equipment - hot, tough, dirty work for both man and beast. When the dust settled and

completion was accepted, the workers paid off and bills settled, little was left. Dad and my hardworking step-mother, Zoe, she cooked for the crew, had little to be jubilant about. While that contract was being fulfilled this boy with an old bachelor hired hand, struggled through the summer doing our ranch work that turned out to be really a lost year all around.

Earlier, as a Boise County Commissioner, dad had initiated buying some of the first

horse drawn road grading equipment for maintenance and improving county roads. Another of his accomplishments was to get the other two commissioners to support building a steel bridge at Gardena and give Jerusalem residents access to the railroad at that point, also an access to the valley for Drybuck farm people. Forging the river was only safe during the low water period.

For some of us, both boys and girls, going away for high school changed forever the pattern of our livelihood beginning right at the outset of the great depression. For me, the experience gained in those years at home, the role models of my work talented father and both pioneering grandfathers served me well for a future career; very rewarding work starting at hard rock gold mining in Boise County that ultimately led to worldwide professional recognition. Ore processing equipment developed and patented by me, has in a 50 year period carried the Clarkson Company business name to more than eighty countries around the world.

Not the least in the making of this story proudly told, is the marrying of a Boise Basin miner's daughter, Edna Mae Evans, my help mate, that has faithfully followed me in my work for those sixty plus years, being a homemaker and raising a family of two, heading into life together



Our Gang (L-R) John Robert (Doc) Clarkson, Willard Miller, Howard (Red) Bates, Clarence (Toots) Thompson and Melvin (Dooly) Shelley at Chas. Sell's Hinky Joint (cards) and Soda Fountain (Photo dated 4/9/1926)

at the outset of our great depression. Our son, Curt, a graduate Mining Engineer, is now the President of The Clarkson Company and our daughter, Claudia's husband is a Senior Vice-President.

Now going back to the earlier scene, much change has taken place over the years, family farms are almost non-existent, a large sawmill took the place of smaller ones, the power generator became obsolete, it and the canal abandoned, the highway built and some sections rebuilt several times over, especially on the north side of the Horseshoe Bend hill. The railroad has survived, but tenaciously; the water tank and the old depot are gone as well as the far end of the tracks between Cascade and McCall. The highway and the overwhelming use of autos, trucks and even air travel have certainly speeded up and broadened our lifestyle but at a high price in the loss of individual and collective pioneer tenacity and earlier day community values.

Happily, for old timers and many others, at least, there is a move afoot to replace the old hydro-plant site with a modern generating facility. Hopefully it will be successfully permitted and thus bring back a bit of the old scene. Even in the eyes and action of other dreamers maybe someday the railroad with modern equipment will make a comeback as a non-heckle people and material mover.

The Clarkson Globe

Volume 6

June 1997

FACES AT CLARKSON

Back in the olden days, when we were still making KGC valves, Robert Keplinger hired on with The Clarkson Company. He started in assembly in August, 1989. I guess you could say Robert is part of the Founders Club for the Molding Department. He started molding KGC parts in 1990, we had one rubber press and all rubber came in pre-milled. Robert thought we were busy back then, now we have 11 rubber presses, 2 rubber mills, 7 people, and a ton of parts going through the department from all our product lines. Robert is currently a Lead Man in the molding department, and he told me that he really enjoys working here at Clarkson. He has watched this place grow over the years, and he sees every day as a new challenge. I asked Robert what his hobbies were, and he said, keeping his kids corralled. Robert's been married 7 years and just had a birthday June 4th. Happy belated birthday Robert, it's good to know you



5 Pillars of the Visual Work Place (5S)

Looking around our plant, office and outside area it is clear that much has been accomplished through the 5S program. Everyone has participated and the teams have all worked well together. I think we can take pride in the fact that the first 3 pillars - Organization, Orderliness and Cleanliness - have been completed in most areas. The many awards that have been presented to team members as well as a tour of the facilities attest to that fact.

The key to total implementation of 5S lies in pillars 4 and 5 - Standardized Clean-up (Neatness) and Discipline. It is one thing to spend a day cleaning out and reorganizing a closet or the garage, but something else entirely - to keep it that way. That is our challenge ahead, keeping our facilities - clean, orderly and organized. That will come from developing habits of always putting tools and materials away in their proper place and personal and departmental discipline to keep work areas clean and neat. Finally it will be in everyone's interest to always look for new ways to improve within the 5 Pillars of the Visual Work Place.

Rick Hubbard will be giving a paper at the APICS International Conference and Exhibition in Washington, DC in October on 5S implementation. We want The Clarkson Company example he will be using to be a good one. Each and every one of us has a personal contribution in its success.

Curt Clarkson

Building Construction

◆ Have you noticed the construction work on the mezzanine? Have you wondered what was going on? The current construction is phase three of a three year project with a total cost exceeding \$250,000.00

◆ **Phase I** Expansion of the quality assurance area (better known as the blue room).

◆ **Phase II** Product supervisor's office area and training room (second floor over the new QA area).

◆ **Phase III** Production manager's, technical support offices and larger conference room for board of director's meetings, etc. (existing mezzanine area).

◆ Our objectives were twofold. Upgrade our quality assurance area/capabilities and consolidate all production management, supervision and technical support staff at one location. The design added two new stairways to the second floor with direct access to the production area, a second training room, a small conference room and the director's conference room.

◆ As soon as our contractor completes this project, we will relocate all production management and technical support associates to the new area on the second floor. The CRST area layout has been redesigned and will expand into the entire north office area.

◆ We anticipate completing this project in June. We thank all of you for your patience as I'm sure any project of this magnitude causes some disruption and inconvenience.



AWARDS

YOU CAN NEVER GET TOO MANY

On May 15th the Greater Reno-Sparks Chamber of Commerce awarded The Clarkson Company the Excellence In Commerce Award. Curt Clarkson was also awarded the Small Business Person of the Year Award by the U.S. Small Business Administration. The criteria for these awards was that the company employ less than 100 people, be in business for at least 3 years, show staying power, increases in sales, current and past financial reports, innovation of product and service, response to adversity, and evidence of contributions to community-oriented projects.

The Reno-Gazette Journal wrote a nice article on May 5th about the companies who were to be recognized and rewarded for their hard work. On the front of the article is a picture of Tom Entz spraying a line of valves. The awards were given at a luncheon held at John Ascuaga's Nugget.

In Curt's award speech he attributed his & the company's success to the associates of The Clarkson Company. He stated without their hard work and dedication none of this would be possible. He also stated that the company's focus on quality has helped in the increase of sales by 27% in the last three years. CONGRATULATIONS Curt & associates of the Clarkson Company.





COLLAHUASI PROJECT

(CIA. MINERA DOÑA INES de COLLAHUASI, S.A.)

(Pronounced coy - u - wa - si)

■ The Collahuasi project is a copper mine located about 170 kilometers SE of Iquique, Chile. The mine is located about 200 kilometers south of the northern border of Chile where it meets Peru and about 30 kilometers from the eastern border of Chile where it meets Bolivia. It is estimated that Chile contains 25% of the world's known reserves of copper and they have adopted mineral rights, mining, and banking laws that are encouraging investment in mining from all over the world. Collahuasi is a consortium owned 40% by Falconbridge of Canada, 40% by Minorco of Luxembourg, and 20% by several Japanese companies. The mine is at 4,500 meters (nearly 14,000 feet) elevation and is actually four separate ore bodies. The concentration of copper averages between 1 and 1 ½ % within the four bodies and the mine is expected to last at least 50 years. They will be concentrating the ore at the mine site and transporting it by slurry pipe line 140 kilometers to a dewatering / shiploading facility on the Chilean coast. The mine will produce over 350,000 metric tons of copper concentrate per year which will yield nearly 50,000 metric tons per year of cathode copper. The project is expected to cost over 712.2 billion Pesos (\$1.7 billion US) before the first product is shipped. The first shipments (or slurry flow in this case) is expected to begin in 1998.

■ SOLTEX, Chile is our representative in Chile and has been working with Davy Engineering through the feasibility study which was completed in early 1995, and now Bechtel / Davy who is doing the engineering and purchasing for the project. The Clarkson Company was asked to quote the concentrator and tailings valves early last year. Vulco of Chile was our main competitor and had offered pricing well below ours for the valves. Vulco had already captured the order for the hydro-cyclones with their own valves used as isolation valves. In the past they have copied the KGC in Chile and Environtech of Brazil (who bought Vulco of Brazil) has been copying the KGD. Neither copy has done well in the field but local content and lower prices make them attractive to Chilean companies. Our experience at many other mines in Chile and other countries in South America won the day for us when the order was awarded to us in February, 1997 for 385,077,892 Pesos (\$919,150) even though Vulco was priced below us. Since the placement of the order, Bechtel / Davy of Chile has been doing some last minute changes to the systems and piping sizes. Change orders have reduced the list price amount to about 372,027,600 Pesos (\$888,000). However, if this project tracks anything like Escondida, additional orders may be placed as the construction begins that would replace the lost amount and then some. These massive projects are usually driven by the initial cost and the low bid normally wins. Falconbridge will be the operator of the mine and they had some say in the selection of equipment because they will be the ones burdened with making the system work. South America has been a successful proving ground for consortiums that combine the skills of large mining concerns, money investors, and end users of the product. They all put money up front and they all benefit from the efficient operation of the mine. The Clarkson products allow the mines to invest in equipment that has a proven track record in the mining business and takes great advantage in the local support of our representatives, in this case, SOLTEX, Chile.

■ We shipped the Collahuasi valves in June

CURRENCY

The unit of currency in Chile is the Peso. Recently the conversion rate for this has been \$1.00 = 418.95 Pesos

METRIC UNITS OF MEASURE

Since most of the rest of the world works on some form of metric measurement system, this sidebar shows the conversions of the measurements used in this article.

30 kilometers	= 18.6 miles
140 kilometers	= 87 miles
170 kilometers	= 105.6 miles
200 kilometers	= 124.25 miles
50,000 metric tons	= 55,115 US tons (short)

BIRTHDAYS

April

4/01 LARRY KOLL
4/02 JIM DITCH
4/02 KIM LEFFERDO
4/06 HANK FROHLICH
4/06 DOUG MERRYMAN
4/09 BRIAN KAGELE
4/12 TUCK EDGE
4/13 JAMIE CARPENTER
4/16 GARY BOYER II
4/16 SCOTT SMITH
4/25 MICHAEL KEENE
4/30 ANJANI TEJENKHOUSER

6/04 ROBERT KEENE
6/08 TOM PATTEN
6/10 K.C. HINTON
6/13 GARY LAXSON
6/13 MARK KUTZ
6/18 EFREN LOPEZ
6/26 EVELYN LITTLEFIELD
6/29 DAWN FROHLICH (30)
6/29 LOUIS LAWSON
6/30 DAVE TURNER

Our heartfelt sympathy goes out to Doug Felker and his family for the loss of their son Tom.

5/01 GARY PARK
5/09 ROGER MCMILLIN
5/09 OMER KING
5/15 SANDI LARSON
5/22 MIKE LANGE

ANNIVERSARIES

5 YEARS

JOHN STEBBINS
ALEX CASTRO
STEVE THOMAS
JEFF BERNARDI
KEN MANTHEY

30 YEARS

CURT CLARKSON

10 YEARS

EVERETT LITTLEFIELD
HANK FROHLICH
ROMEO LUTHERO
BOB KEANE
DAWN FROHLICH

Mollie Mac

Congratulations to Dawn & Kurt Frohlich on the birth of Amber Rose on February 12 weighing in at 8 lbs 2 1/2 ozs.

New Grandpa and Grandma Curt and Margie Clarkson on the birth of 8 lb 1 oz Mollie Mac born to Brenda & Eric Nordin on May 24.

from The Clarkson Globe

March 1998



AFTER SCHOOL PROGRAM

This semester the After School Program has developed a new approach by separating the younger grades from the older grades. This seems to be quite popular with the students attending. Ryan Beeson says he likes it "because the big kids and little kids don't fight and get in each other's way anymore". Keri Moran says she likes it "because there is not a big fuss anymore when asked to do something by Mr. Howe". The older classes are getting to cook, do more artwork and they made a mine out of salt dough.

Janna Bonno is the new student aide this semester and Carmel Javaher is the continuing aide. They both deserve a lot of credit for the time they put in with these kids helping them read, write and with their homework.


Jeff Merryman likes coming to the program for "snacks and now they can cut the room in half". Kyle Smith likes to draw and Devan Taylor says he likes it "because he has more free time here than at school". Mr. Howe then commented on how important "free time" is for the kids. They are still learning, but under a less structured, regimented environment.

Alan Moran says he likes building the building. After a short explanation I determined that what was happening is they are making buildings out of paper, and they will ultimately have a "paper town". Alan wants his building to be a "KFC".

Danielle Lacombe says she likes the program "because she can do her homework here". Genee Beeson says she likes it "because she gets to do art, read and write with Mr. Howe and Carmel and Janna".

Besides the extra time spent with Mr. Howe and the aides, these kids get an opportunity to spend time with their working parent during the workday that would not be possible otherwise. Even the time spent in the car to and from the program is very important for both the kids and their parents.

From everything observed in this interview, I think the Clarkson Company still has a winning program and is very much appreciated by both the kids and the parents.



A MILL MAN'S LAMENT

Years ago I herded woolies
 Yes, a shepherd was I then
 But I swore I'd be a starving
 Before I would herd again.

So I quit them for a quartz mill
 And I gladly said, goodbye
 Now I fear that milling has me
 Until the day I die.

When I was herding sheep, I thought,
 That nothing could be worse
 But when I'm done with milling
 They'll be sending for the hearse.

Repair days now are coming
 By the bushel and the peck
 For the shaker screen has gone to thunder
 and a hole is worn in the deck.

The ore bin, it is a wreck
 The feeder, sure 'tis Hell
 And next will be the crusher
 But just when is hard to tell.

The old ball mill has sprung a leak
 On the starboard side astern
 There's wisdom in that legend,
 "You have to live and learn".

The motor is on the hummer
 And the classifier, it is bent
 We have had it apart just three times now
 and on it two weeks spent.

This is cleanup day and then graveyard
 The day shift is the Devil
 But ~~there~~ is nothing worse than three o'clock
 I'll tell you on the level.

Oh, you spend your days in cussing
 And the nights without your sleep
 The way that things get broken
 Is enough to make anyone weep.

I dreamt a dream the other night
 That made my blood run cold
 I saw myself laid down to rest
 In a coffin lined with gold.

The Devil bent above me
 And on my tombstone wrote
 With a chisel bar and hammer
 "A quartz mill got his goat".

EDNA'S REMINISCING

(1927 – 1935)

Looking back to 1927 is some time ago. That was the year Lindbergh flew the Atlantic, from the east coast of our United States to France. It was a big thrill for young people to know of that accomplishment. How excited our high school was when Boise was one of Lindbergh's stops, on his around the country tour promoting aviation.

When Bob started his flying lessons, the dream of his life, about 1929 he was doing odd jobs at every opportunity at the air field, then located on the Boise River in south Boise. Every spare dollar he would earn went into a flying lesson.

After he started coming to see me during the winter of 1930, he would use a few of his precious earned dollars to take me to the Mechanicafe for dinner. There each person paid 50 cents, sat down on stools in front of a conveyor belt that went by carrying entrée, salads, desserts. The customer picked their choice. One could eat as much as his appetite wanted, but couldn't take anything out of the restaurant to eat at a later time. A dollar of Bob's saved money was then spent on the movie we had chosen to see and then on home to my folks. He didn't have a car, only a bike and a horse, so we walked almost everywhere we went. Bob had finished high school in 1929 and he had been working for a trucking company, a summer-time job. Since his run into the Boise Basin was not open in the winter because of snow, he didn't always have work. After I graduated in June of 1930, we began to talk of marriage. The depression years didn't hold much hope for a girl to find any kind of work and there was no hope of going on to college unless your folks could send you. Some of my friends would be going on

to the University of Idaho, and a few to the College of Idaho at Caldwell. By spring and nice weather, Bob was driving truck again during the week and spending some weekends at the airport.

Those were the years of barnstorming. The pilots would fly their aircraft to small towns around the country, take a student that was working for his pilot's license – the young hopeful would go into the crowd that flocked to the field when the plane landed, and sell tickets for 15 minute rides. Doing that would help Bob earn money toward paying for his flight instruction. This went on during the spring and summer of 1930.

Watching my brother, Jack, play baseball (brother Howard was the ump) at Placerville on the 4th of July, Bob and I talked of our plans. He was still driving truck, although the trucking company owners hadn't always been able to pay him. He lived at one of the partner's homes as one of the family. Getting room and board was sometimes his only pay. We decided that we would be married August 5th at that 4th of July ball game.

The trucking company owed him about \$500.00 in wages. That was the nest egg we planned to use to start married life. We thought we would get a new model A Ford Roadster, which we would have to pay cash for. It cost under \$500.00 and we would have some money left over. The Ford dealership was downtown on 10th Street in Boise. We spent our evenings looking in the window at the car in the showroom, confident that we would get the money owed Bob, and that car would soon be ours. The trucking company partners were honest, but they just didn't have the money for Bob as people that owed them couldn't pay either. On August 4th, Bob waited at the trucking company office to see what they could do. The two partners finally took the cash they

each had in their pockets, which amounted to \$25.00 and that was all they could give him.

My Dad was manager of the Belshazzar Mine near Placerville. Bob and I had gone up to spend the day with him the week before, and to tell him of our plans to marry on the 5th of August. Poor Dad, as his "baby girl", he hadn't expected that out of the blue. In the meantime, Bob had told the fellows at the airport of our plans. They said why not be married in this airplane, which happened to be a brand new sister-ship of the Spirit of St. Louis, Lindbergh's plane. We both agreed that would keep my mother from spending any money on us, as the flying service would give us the time in their new Ryan. Quickly, the plane was washed and shined to be ready for the flight above Boise at 7 pm Tuesday, August 5th. My mother would have loved to have gone up with us, but she had heart trouble, and any sudden change in altitude had proven bad for her in the past. She and my sister, Eleanor, with 12 year old Ned and other guests stood on the field as we took off down the runway. Manley Richie, Bob's flying instructor and pilot of the plane, and my cousin, Josephine Ruick, were our witnesses. Justice R.W. Adams officiated.

Bob had quit his job that didn't pay him anyway, and we lived at home for a month with my mother, sister, Eleanor and brother, Ned. When Dad came home for a few days visit, he told Bob that he would give him a job at the Bel, but Bob would have to fix a place for us to live. We were thrilled with that news, as we had no idea where Bob would find work other than helping his Dad on the ranch. With that exciting offer, we went uptown to a wholesale grocery warehouse and bought \$125.00 worth of staple groceries, a wintertime supply. We charged them with the understanding that we would

pay \$25.00 a month until they were paid for. We also bought a bedroom set, cook stove and table and chairs at Sears, to be paid in small payments each month. Our cooking utensils were bought at Woolworth's.

Off to the Bel we went. A bachelor had been living in two work rooms in the old abandoned stamp mill building and he had just moved out. Dad told Bob he could fix that up for our winter's home. Bob lined the two lower rooms with building paper. We put new linoleum on the wood floor making a very cozy place for our winter living.

Dad was still unhappy about my marriage, because it had come sooner than he expected and after all, I had a sister and brother, both older, that hadn't married yet. Dad boarded at the boardinghouse, but was happy to eat an occasional meal with us. So, Dad adjusted to the situation, and finally Bob was another favorite son.

The winter of 1930-1931 was uneventful, with lots of snow to shovel and I had to learn the ways of a young bride. I had always helped with cooking and housework at home so keeping house wasn't a new experience for me. However, mining camp life was quite lonely.

Bob started in the mine as a mucker, making \$4.00 a shift. The mine crew worked two shifts, day and night, 7 days a week so Bob would take his lunch and be gone from home about 9 hours. Two weeks on day shift and then a long change and two weeks on night shift. My days at home were long and sometimes boring. There were only two other families living in camp. The other men all lived at the bunkhouse and ate their three meals at the cook house.

I did get homesick for my mother, and for a long period of winter was unable to see her. We could only make the 50 mile trip to Boise when the road was open.

During the fall, Jack had a Pontiac coup, and we borrowed it whenever it was necessary for us to have a car. Both brothers, Jack and Howard, worked at the Bel for Dad, too.

This was a highgrade, hardrock gold mine that produced gold found in pockets and veins of big pay. Finally by the summer of 1931, the rich ore had all been mined out causing the mine to close. This was a big shock to our family as it meant the four men were out of work. We had all gone home to tell the sad news to mother and Eleanor when we had a telephone call from Placerville telling us that there was a forest fire on the hill above the mine. As it turned out, the wind changed and the fire didn't burn the Bel, (we would have lost all of the things we had accumulated that first year) Instead it went in the direction of Quartzburg, burning most of the town and mine buildings there as well as acres of timber as it swept the Basin. Bob, Jack and Howard headed from Boise to Placerville to join the other fire fighters working to save the towns and camps.

After fighting fire for a few days, Bob decided he had better head for Stibnite and see if he could get work there. His Dad and Stepmother had gone there and his Dad was working as a millwright, so Bob could stay with them. Stibnite was a new gold mine and, because jobs were scarce and the crew small, there was very little hiring. It so happened that the day he arrived, one of the men working in the mine quit and Bob was hired to take his place.

We had saved our money that first year of working at the Bel, and were able to buy the Ford we had dreamed about. Bob had left Boise for Stibnite in our new car. It was a long six hour drive to the end of the road. We always said as there was only a

one way road into that mining district. I was waiting at my mother's to hear from Bob to find out whether or not he found work. Word came he had gotten a tunnel mucking job. I would go visit and see how I liked the camp. I was willing to go and did find a ride in with some people that had been in Boise shopping for winter supplies.

Bob's folks had a comfortable two-room cabin that consisted of a small bedroom and a larger room that served as a kitchen, front room and living room. I shared the cot in the room that Bob was sleeping on. Any family that lived in the camp had to fix their own living quarters. The part of the camp where Bob's folks lived also had been the saw mill camp, run in the summer for the mine lumber supply. Those workers had tent frames that had been their summer home. Bob was told by the management that he could have one of the tent frames and lumber to put a roof and sides on it to make it livable for the winter. This was early October. Bob had to shovel snow off the floor of the frame and work on our house after his daily shift was over. I was reluctant about living in an isolated mining camp. But, after going back to my mother's, and the wise advice she gave me, I packed what I could take in our little Ford and Howard drove me into Stibnite where we would live the next nine months without leaving camp. Howard returned to Boise with our car, as cars were not left in camp during the winter in the early years of snow closed roads.

We didn't have any of the furniture in Stibnite that we had bought to have at the Bel. For a bed, Bob found an old bed spring, made a frame, along with a pad for a mattress. I had brought the bedding, dishes and cooking utensils when Howard had driven me in. We lived in that cabin for four years. Each summer, Bob made improvements on it with powder box cupboards added, too! Water was drawn out of a

stream coming from the reservoir above our house. The four families living in this part of camp carried their water from a hole cut through the ice in a nearby stream. The husbands usually carried two buckets morning and night and of course extra water on wash day. We had no electricity in our cabins either, making our wash days done in tubs and wash boards.

Bob again was working shifts – day shift, swing and graveyard. Our cabin was nearly two miles from the portal of the tunnel and he walked those miles through the winter. Because of the distance he had to walk, he was away from home ten to twelve hours a shift. Many nights coming home at the end of swing shift, he waded through deep snow, sometimes in a blizzard.

There was a one-room school in Stibnite and the women worked at having Sunday school, but of course, we had no minister. The men all worked 7 days a week. Some of our entertainment consisted of battery radios and we organized a club, played cards on two Saturdays a month and danced the other two Saturdays. Bob's Dad played the fiddle and one of the men chorded on the piano. The camp mail and some perishable groceries were brought in on the plane that usually flew in twice a week, weather permitting. During the winter months, it wasn't unusual for two or three weeks to go by without seeing the plane fly over the mountain and we would all watch in hopes it would be clear. It was the first of flying service.

There was a forest telephone line into camp, but personal calls were only made in an emergency because the calls had to be relayed. Bob's folks lived in the cabin close to us. Though Zoe was a good wife to Dad Clarkson, it was hard for her to accept his children, all grown up and married. She had a son and daughter that came first to

her. I was always thrilled when she would ask us to eat a meal with them, especially on the nights when Bob was on night shift. Zoe had been a ranch wife in the earlier years of their marriage and did the food preparation that ranch people do, planning for winter. She taught me to make sour kraut, mincemeat out of wild game and "head cheese" out of the butchered pig we would buy together in the fall.

My mother was a good cook and I had always helped her, but she hadn't done the kind of cooking that ranch women do. At holiday time, the four couples that lived in our complex of cabins shared Thanksgiving and Christmas dinners together.

The camp had only had a company commissary store until the summer of '31 when Frank Callender's father from Cascade set young Frank up in business in Stibnite with a General Store including dry goods. He was also appointed postmaster, all under one roof. Those were the years we could live on a dollar a day. Every one charged their groceries, which was deducted by the company from the monthly paycheck. Frank was single at that time. He was Bob's and my age. The friendship that started then, lasted through the years until Frank's death at age 76. He was married 3 times and became a well-known Idaho banker.

When we look back on those years in Stibnite, there are many things we did to get by and have fun; such as having one pair of skis between us, home-made by Dad Clarkson. Bob put his feet in the straps and I stood behind him with my arms around his waist. We'd ski to lower camp, two miles downhill, visit friends and then walk and carry the skis back home. To supplement our meat supply, Bob hunted snowshoe rabbits – taught me to cook them, as well as eat rabbit, something my family had never done!

By the winter of 1931-1932, Bob and I were nicely settled in our cozy cabin. The depression was at its peak in Boise, as well as in other Idaho mining areas. Howard and Jack were both out of work, living at home. Dad was the watchman at the Belshazzar and had been since it had closed in the summer of '31. Dad's income wasn't enough to meet all of the expenses of the family in Boise. Eleanor had taken a beauty course and her income as an operator was unselfishly shared with those at home. Bob, always generous in thought and action, called Howard and told him if he would come to Stibnite and stay with us, he might be able to get work in the mill, as it was to be remodeled. Bob had been promised a job as mill shift operator. We were looking forward to that as it meant he wouldn't have the long walk to the lower camp, (Monday tunnel) and would not be working underground. Bob sent Howard \$25.00, the fare to fly in (the only means of travel in the winter months). In about six weeks time, the mill was ready again and then both Bob and Howard were ball mill operators, each working one of two shifts, seven days a week, making \$4.50 a day. Howard first had been sleeping on a cot in our front room, then, after he was hired, he moved to the bunkhouse and ate his meals at the cook house with the other men.

Mother's health started to fail in the spring of '33. After being bed-fast for several months, she died in October of that year. This made a change in our whole family. Dad broke up the family home as Eleanor was planning to be married and was moving to Oregon. Ned spent part of his summer with us and later with Dad, though he lived with Eleanor and Hank during the school year for his high school years.

The fall of 1934 brought a young, single school teacher to Stibnite, Lois Gillett. Bob and I had planned a month's vacation to take Dad to Arizona to visit a sister,

Margaret McEvoy. He hadn't seen her in years. Aunt Maggie was Ethel Townsend's mother, the plans were that Ethel would have her mother and brother, Uncle John Evans, come to Phoenix and the three surviving members of that generation of Evans' would have a reunion. What a wonderful time we had. Ethel and Clarence couldn't have been more gracious to the relatives they had only heard of. Their son, Ralph, was 9. He added to the fun of our visit. This trip was a great experience for us. We saw cotton growing in the fields, date palm trees and orange groves and Casa Grande National Monument and Museum. That impressed me.

Ethel had a Chevy Convertible with a rumble seat. She put her two uncles in the back, her mother in the front with her and away we would go sightseeing. Bob, Clarence and I followed in our V8 Ford Coupe.

On our trip, which lasted a month traveling through Phoenix, we drove to San Diego and up the coast to Portland and home to Stibnite. We had left camp September 15 and returned October 15, getting home as winter was getting started. At that point in time, Lois had heard about us from Mrs. White, the wife of the manager, (Lloyd C. White), at the mine. This being her first school as well as the first mining camp she had ever lived in, she was anxious to make friends. There weren't many young people in camp, not single ones, anyway. Lois and I hit it off real well, and became close friends. She and Howard were married a year and a few months later. We have been sister-in-laws for 52 years and she was a very dear friend and sister. She is now deceased.

After making the trip to Arizona and visiting with friends in San Francisco that had moved away from Stibnite, we started thinking of our future. Bob had high hopes of being more than an ore mill man. He had a promotion from ball mill operator to

Flotation operator – that meant \$5.00 a day! We had made very dear friends in these years at Stibnite and it was hard to tell friends that we were planning to leave. Bob's folks still lived there. We kept our secret to ourselves, but then talked of leaving the security of this small camp and venturing to California in June of the following year. The former mill superintendent, Hal Lewers, had left for Grass Valley and told Bob that if he wanted to make a change, he would do what he could do for him in California.

In June of 1935, we left with our car packed with our worldly possessions; our bed roll tied on and a rocking chair that mother had given us – she had it for years. The accumulation we had in our cabin – dishes, furniture, etc., we sold to our friends, Verne and Mary Thompson for \$125.00. Verne was a mill worker. They were living in a small one-room cabin and we asked the company if they could have our house, really a cabin. They didn't have much in the way of furniture or housekeeping things and would buy ours if they could get the place. The company still had all of the say about housing.

Earlier, Howard had an offer to go into the grocery business. He had moved to Yellow Pine to work for Levander's Grocery Store. Lois was finishing her first year of teaching and planned to come back in the fall. Robb and Lew Clapp had been assigned a house close to us. How we hated to tell them all that we were leaving – pulling out.

Our trip to California was uneventful, with the exception of the periodic flat tire, caused by the cold patches used on the tires then going into the hot weather. The night out between Oregon and Grass Valley we rolled our bed roll out to sleep. When we awoke at daylight, there were cows grazing curiously around us. We arrived in Grass Valley the next day and went to see Everett and Myrtice Adams – former Stibnitters. Everett had gotten on as a mill man at the Idaho Maryland and was working

for Hal. People shared with others without expecting anything in return. It is heart warming. We were all used to small living space!

CHAPTER 2

LIVING THE AMERICAN DREAM

(Edna's reminiscing 1935 and on)

Moving to Grass Valley was a big step in our lives. There were no rental houses and Bob didn't find work for a period of time. After making trips to mines in other areas, (Mr. Lewers didn't yet have a mill job opening) Bob decided to take a temporary job that became available of driving ore truck for the Idaho Maryland Mine. We could have gone to a mine in Plumas County for a mill job, but decided to wait until there was an opening at a mill in Grass Valley. So, truck driving again would do fine for a time. We continued to live with the Adams family for the summer. By fall, we found out that a duplex would be available in October as the people were building a new house next door. It just happened that the couple that was renting the other apartment was retired. The lady had been a secretary and would turn out to be a be a good friend to Bob. She would type his letters to American Cyanamid while he was working on his new invention.

During the first 5 years of our marriage, Bob's flying was put on hold because of living in the mountains. But, flying was always his first love (I'd kid him). After getting settled in our own house and we were receiving a monthly check, his dream started again.

The owner of the mining company, Errol MacBoyle, lived above the mine on some beautiful acreage. The private company airport was there, too. Bob started taking flying lessons from the company pilot to obtain a limited commercial license. It took persistence on Bob's part to keep at his flying. He loved every minute he was in

the air, and always wanted me to like it as well. He hadn't gotten his license yet, but was ready. Once after a lesson, he asked his instructor if he could take me for a ride. The instructor said, "If I'm not at the air field, I won't know it, will I?" So on Saturday morning, we flew over Grass Valley. Bob had the pleased, happy expression that he shows when things please him. Remember, the field was a private field and we were the only ones there that morning, other than the ranch watchman.

During this period, Bob was also working on his Feeder that would eventually be for the beginning of the Clarkson Company that our family enjoys today.

Due to the upsurge in gold mining, renting in Grass Valley continued to be difficult during these years. We finally found a small duplex close to the Spring Hill mine. My dad had moved to Grass Valley to be near us and became the watchman at the Spring Hill. Jack was working at the Old Brunswick, one of the Idaho Maryland mines. Later, he went to work for Newmont at a Browns Valley mine as a shift boss.

Claudia was born on November 2, 1936 at the Landis Clinic in Grass Valley. We managed very well in the small duplex. It was furnished and had a kitchen, bath and front room with a bed that folded up into a closet during the day (called a Kelly bed).

Bob had gotten well acquainted with the American Cyanamid people and was getting quite well known around in the ore milling field of gold mining. The Feeder by then, 1936, was being manufactured by Cyanamid to be used in the feeding of their reagents into the flotation process of ore concentration in other areas.

MILESTONES

MAY 13, 1999

EDNA MAE EVANS CLARKSON

Edna Mae Evans Clarkson, 87, died Saturday, May 8, 1999, at her home in Reno.

A memorial service was held at St. John's Presbyterian Church, Reno, Nev., on Wednesday, May 12, 1999. Interment will be at the Pioneer Cemetery at Horseshoe Bend on Tuesday, May 18, 1999, at 3 p.m.

Born at Quartzburg, Boise County, Idaho, on June 2, 1911, Edna grew up in the Boise Basin Mining District and attended school there and in Boise, graduating from Boise High School in 1930.

She was third of two girls and three boys born to Parley J. and Grace (Cunningham Ruick) Evans. Edna and Bob Clarkson married on Aug. 5, 1930, at Boise beginning a life together that spanned nearly 69 years. Through the 1930s and 1940s Edna and Bob lived a pioneering life in remote mining camps of Idaho, California, Nevada and Arizona.

Accommodations ranged from a tent house to making do in an old stamp mill building, to a cabin Bob built on a tent frame with scrap lumber to modern mining camp housing. No matter what the situation Edna made a comfortable home for her family that always had the welcome mat out.

Moving from Stibnite, a remote mining camp in central Idaho, in 1951 to start a manufacturing business first in Boise and then moving on to Palo Alto, Calif., was a cultural change for the Clarksons, but Edna adapted and the rest of the family fell in line.

For 34 years in Palo Alto Edna was an active parent and homemaker. Through the 1950s the Clarkson home was always a gathering place for school kids where the rugs were rolled up for dancing and the living room and back yard became a campground.

Actively involved in the Palo Alto First United Methodist

Church and her PEO Chapter, Edna was ever ready to lend a helping hand. She especially enjoyed helping elderly widowed ladies by picking them up for church activities or simply spending an afternoon with them. She also spent many hours in the church kitchen helping prepare meals for fellowship activities.

When grandchildren came along, "Doll and Grampy's" home was a place they loved to go. Since they were all granddaughters a very special relationship existed with Edna, who was known to each of them as Doll.

When the Clarksons moved to Reno in 1985, Edna and Bob joined St. John's Presbyterian Church where Edna completed training as a Stephen Minister. She also continued active participation in PEO and was a member of WAAIME.

Survivors include Edna's husband J.R. (Bob) Clarkson of Reno; her daughter and son, Claudia King and Curtis Clarkson, both of Reno; four granddaughters, Kristin Morana of San Jose, Calif., Karen Richardson of Woodland, Calif., Cheryl Trotter of Palo Alto, Calif., and Brenda Nordin of Fremont, Calif.; and five great grandchildren. Also surviving is a brother, Lt. Colonel (retired) Edward Evans of Woodland, Calif.

The family requests that memorials be sent to St. Mary's Foundation Hospice of Northern Nevada, 1155 W. 4th Street, Suite 224, Reno, NV 89503 or your local hospice.

ENTERED INTO LIFE

June 2, 1911
Quartzburg, Idaho

ENTERED INTO ETERNAL LIFE

May 8, 1999
Reno, Nevada

GRAVESIDE SERVICES

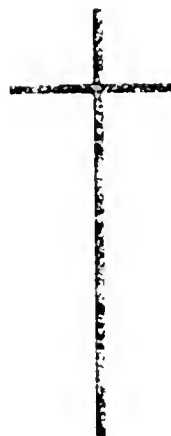
Tuesday, May 18, 1999
Three O'Clock
Pioneer Cemetery
Horseshoe Bend, Idaho

OFFICIANT

Reverend Robert E. Stover

HONORARY PALL BEARERS

Bud Wilson	Ed DeMoss
Horace Morana	Tom Richardson
Eric Nordin	Rob Trotter



LONGING FOR THE GARDEN

It started in paradise, a beautiful place,
as we look around now, is it still here,
sometimes not a trace, God gave us a
garden, a place with him to dwell, and
that started it all, His story to tell.
He wanted to be with us, to love us, to
care, Everything about Him He wanted
to share He breathed life into us, He
chose to create, He created Adam and
then Eve, His wonderful mate.
So they lived with him in joy and peace,
The plan was forever, not just a lease.
They spent time together with God in the
garden, in joy, no shame, But then it was
time, the temptation came. The serpent
formed his plan, it was time for creation
to choose. We chose pride, and with it
God and the garden to lose. But
remember this is God's story, He had a
plan. Get us back to the garden, enter,
Jesus the Son of Man Jesus, Our hero,
this kind was rare, for to get us back to
the garden, our sin he would bare.
He left his garden, that most beautiful
place, He lived amongst us to save the
human race. He belonged to a family.
He worked and he played, but through
prayer and a holy life close to his father
he stayed.

So he performed miracles, taught
great lessons, and healed, But more
than anything our longing for that
relationship with him, He revealed,
Then it was time, time for him to
atone,
Atone for our sins and return to his
throne, But he was human.
He knew the pain He would endure
I rather take this cup from me, Isn't
there another way to make them
pure? Father, I commit my spirit unto
Thee. And those words erased the
curse that started from that one
apple tree. The Serpent was defeated
by the ultimate act of love, We can now
return to the garden, to be with the
one from up above. That is God's
purpose for you and for me, To get us
back to the garden where He intended
us to be. So, where are you now, where
have you chosen to live? Out in the
desert, or in God's Garden, where his
love He freely gives? So as you live
your life in the world with trials you
face, Go to God in his garden, from
the beginning it has always been your
place.

By: Cheryl (Clarkson)
Trotter

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Eleanor Herz Swent

Born in Lead, South Dakota, where her father became chief metallurgist for the Homestake Mining Company. Her mother was a high school geology teacher before marriage.

Attended schools in Lead, South Dakota, Dana Hall School, and Wellesley College, Massachusetts. Phi Beta Kappa. M.A. in English, University of Denver. Assistant to the President, Elmira College, New York. Married to Langan Waterman Swent, mining engineer.

Since marriage has lived in Tayoltita, Durango, Mexico; Lead, South Dakota; Grants, New Mexico; Piedmont, California.

Teacher of English as a Second Language to adults in the Oakland, California public schools. Author of an independent oral history project, Newcomers to the East Bay, interviews with Asian refugees and immigrants. Oral historian for the Oakland Neighborhood History Project.

Interviewer, Regional Oral History Office since 1985, specializing in mining history. In 1998, awarded LL.D. by South Dakota School of Mines and Technology.

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